THE IRON TRADE REVIEW

VOLUME XXXIV. CLEVELAND, O., JULY 11, 1901. NUMBER 28

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The strike at the mills of the American Sheet Steel Co. and the American Steel Hoop Co. has led in interest, among surface developments in the market of the week. At this writing the announcement of a conference at Pittsburg on Thursday between representatives of the two companies and the Amalgamated Association, with the prospect that a settlement will be reached, divests the strike of much of the importance that it has assumed in the newspapers for a week. The features of the situation in sheets that interest consumers are the fact that independent producers are not meeting the reduced prices of the American Sheet Steel Co., and the announcement by the latter that new orders for the mills on strike cannot be filled short of seven weeks after the termination of the strike. The mills of the Republic Iron & Steel Co. resumed on Monday and all finishing mills unaffected by the strike are in full operation, including the non-union mills of the two companies involved. While the intense heat and the holiday have affected all business, the iron trade has given no evidence in the week of lessening consumption. Finished lines have given best proof of activity. Pittsburg reports contracts for steel bars amounting to 20,000 tons on the agreed basis of 1.40c. at mill. The Cleveland district has shown special activity in this line, with 4,000 tons closed and 2,000 tons pending, all for bolt and nut concerns. To the vessel business announced last week have been added further contracts with the American Shipbuilding Co. and the plates and shapes booked in the week on this account foot up 10,000 tons. The report from the mills generally is that bookings continue to be heavier than shipments and that inquiries are good. The plate manufacturers at their meeting in New York made no change in prices, and this trade is in better condition than for several months. Bar mills are kept busy and the indications are that the agricultural buying of the next two months will be a considerable factor. The pig iron situation has not changed in the week. Furnaces report good inquiry, with indications of a large volume of business in July. Concerning prices reports are not uniform. Weakness on the part of some Southern sellers persists. The expectation that the strike may curtail consumption of mill iron has no doubt been a feature; but the inequality is more marked in foundry irons, some producers showing a good deal of anxiety for orders. Thus far the rule has been to buy for the near future, though there have been some exceptions. Until producers show more united firmness, buyers are not apt to fear that the market will get away from them. In the Central West the decision of several merchant furnace firms to produce forge and malleable Bessemer reduces the number competing for steel works orders. Prices of Northern iron are unchanged at $15.25 for Bessemer (in which July and August output is well sold up), $13.50 for No. 2 foundry, $15 at Valley furnace for chilled basic, and $13.25 at furnace for forge. Under a reduction of 50 cents in freight on export pig iron some inquiry from abroad has come to Alabama furnaces, and some revival in this trade may result, though conditions on the other side are not appreciably improved.

It is reported that Southern furnaces are about to revive the association they had two years ago, for maintenance of domestic prices on pig iron, on lines similar to the Bessemer Association in the two Valleys.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, July 10.

The sheet mill strike, and the strike at half of the plants of the American Steel Hoop Co. which has been pending for nearly two weeks will probably be settled before the end of the week. A conference is to be held here on Thursday between the officials of the American Sheet Steel Co. and the American Steel Hoop Co. with the Amalgamated Association officials, at which it is believed a settlement of the differences will be made. The discharge of a number of employes at the Wellsville, O., plant of the American Sheet Steel Co. further complicated matters this week and called forth a statement by President Shaffer of the Amalgamated Association that unless these men were reinstated there would be no conference. However, judging from the fixing of a date for holding a conference, it would seem that this matter has been either waived or temporarily adjusted.

There was a general resumption at nearly all the mills this week and in the Youngstown district all the plants of the Republic Iron & Steel Co. resumed operations. Owing to the immense tonnage that nearly all the manufacturers are carrying on their books they cannot afford to keep their plants closed for any extended period and repairs of only the most urgent nature were made at the mills last week, when they were closed for that purpose.

The pig iron market continues strong and sales of Bessemer iron have been fairly large for delivery during the next three months despite the fact that last week was an off week. The American Ingot Mold Co. closed contracts for a considerable tonnage of Bessemer iron during the week at $15.25 per ton at the Valley furnace. Forge iron also continues in fair demand and several large contracts were closed during the week at $14 per ton, Pittsburg. Inquiry for foundry iron for delivery during the second half is much better than for some time and contracts for about 5,000 tons have been closed. In the Birmingham furnace district an effort is being made to organize an association of the operators on lines similar to that of the Bessemer pig iron association. Considerable Southern iron is sold in this district when Northern irons are ruling high and for this reason an association of this kind in the South would be of much interest locally. Southern forge iron is being offered in this market at the present time at $13.75 per ton delivered, and several thousand tons have been sold during the week.

In finished lines the market continues to rule strong and deliveries on structural material, sheets and tin plate cannot be promised in less than three months. The plate situation is also stronger and local mills are comfortably filled. There was additional contracting on steel bars during the week, and before the end of the month it is probable that practically all of the manufacturers of agricultural implements will have placed their contracts for the last half of the year. A good demand exists for rods and Jones & Laughlins, Ltd., and the Union Steel Co. are both sold well ahead at $38 to $39 per ton.

PIG IRON.—During the week a number of furnaces in the Valleys decided to forsake the manufacture of Bessemer iron

entirely and to operate in the future on forge and foundry irons altogether. This move will further curtail the production of Bessemer iron at the Valley furnaces. Despite the fact that last week was considered an off week contracts for a round lot of Bessemer were placed and several thousand tons of malleable Bessemer were also purchased by local consumers at $14.75 to $14.90 at the Valley furnace. A good demand for forge iron is also reported at $14 per ton, Pittsburg. Basic iron is ruling firm at practically unchanged prices. A better demand exists for foundry iron and sales of about 5,000 tons for delivery during the second half of the year are reported. Stocks at all of the Valley furnaces have been further reduced during the past month and the furnaces are pretty well sold up for delivery during the next three months. We revise our quotations as follows:

Bessemer, Valley	$15 25
Bessemer, Pittsburg	16 00
No. 1 Foundry	15 00 to 15 25
No. 2 Foundry	14 50 to 14 75
No. 3 Foundry	14 00 to 14 25
Gray Forge, Pittsburg	13 75 to 14 00
Basic, Valley	15 00 to 15 25
Basic, Pittsburgh	15 75 to 16 00

STEEL.—One of the largest producers of finished material in this district is at present buying open-hearth billets. This condition has been brought about by the big increase in the capacity of the finishing mills of late by this concern. A good demand exists for Bessemer billets which are selling at $24.50 to $25 per ton for delivery within the next two months. Open-hearth billets are quoted at $26 to $27.

FERRO-MANGANESE.—Foreign manganese, 80 per cent continues to be sold in this market at $55 per ton. The foreign product containing from 70 to 75 per cent manganese is being offered at $53.50 per ton. Domestic manganese continues to be quoted at $58.50 per ton delivered at buyer's mill.

MUCK BARS.—Owing to the shutting down of a large number of puddling furnaces during the past week the scarcity of muck bar for immediate shipment is more pronounced than it has been for some time. One sale of 500 tons has been reported at $31 per ton, shipment to be made within the next two weeks. For extended shipment contracts are being closed at $28 to $29 per ton.

SKELP.—With the shutting down of a number of the pipe mills the demand for skelp has fallen off to some extent and the demand for this product for immediate shipment is not as great as it has been. Prices are also somewhat lower. We quote grooved and sheared iron skelp at 1.82½c to 1.85c, while grooved and sheared steel skelp is selling at about $2 per ton less than the above price.

SPELTER.—Prime Western grades continue to be quoted at 3.93c to 3.95c, delivered, Pittsburg. The demand continues fair.

RAILS AND TRACK MATERIAL.—The price of standard section rails continues unchanged. Demand for light sections is strong, but immediate delivery is practically out of the question. The demand for track material continues fair. Our quotations unchanged are as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $38; 16 pounds, $35; 20 pounds, $34; 25 to 40 pounds, $32. Track material: Spikes, 1.95c to 2c; track bolts, square heads, 2.40c; hexagon heads, 2.55c; fish plates, 1.50c to 1.60c.

PLATES.—At a meeting of the plate manufacturers held in New York last week ruling prices were reaffirmed. The demand for plates is reported much better than for some time and the mills in this district that were almost caught up on their orders a month ago now have several months' tonnage on their books. Prices are unchanged as follows: Tank plate, ¼-inch thick up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. M. B. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

BARS.—The steel bar situation is much better than for some time and a number of the agricultural implement manufacturers who held off on closing their contracts for the next six months have come in during the week and it is estimated that contracts for fully 20,000 tons have been placed. Steel bars in carload lots are quoted at 1.40c while in less than carload lots the price ranges from 1.45c to 1.50c. Common iron bars are quoted at 1.45c, Youngstown, and 1.50c, Pittsburg. Refined iron bars are held at 1.75c and upwards.

SHEETS.—The closing of the sheet mills of the American Sheet Steel Co. on account of the Amalgamated strike to the number of about 100 has greatly increased the scarcity of sheets. It is impossible to secure sheets for immediate delivery from either the American Sheet Steel Co. or the various independents. So crowded are the mills of the American Sheet Steel Co. now in operation that no shipments are promised in less than three months and owing to the large tonnage booked for the mills now closed on account of the strike no shipments can be promised from them until six weeks after their resumption. While some of the independent manufacturers assert that they will not meet the recent reduction made by the American Sheet Steel Co. the fact remains nevertheless that even though they were to meet the reduction they are unable to make immediate shipments. On lots in 500 bundles or more of black sheets, one pass through cold rolls we make the following quotations: Nos. 10, 11 and 12, 2.30c; Nos. 14 and 15, 2.40c; Nos. 16 and 17, 2.50c; Nos. 18, 19, 20 and 21, 2.60c; Nos. 22, 23 and 24, 2.70c; Nos. 25 and 26, 2.80c; No. 27, 2.90c; No. 28, 3c; No. 29, 3.15c; No. 30, 3.25c. On lots less than 500 bundles the American Sheet Steel Co. will not make shipments except through jobbers and for direct shipments from mill in less than carload lots an extra charge of 10 cents per 100 pounds is made. Jobbers' prices on lots less than 500 bundles are $2 per ton above the quotations noted. Galvanized sheets are held at 70, 10 and 5 off in lots of 500 bundles and over and at 70 and 10 in smaller lots.

PIPES AND TUBES.—There was a general resumption at the mills of the National Tube Co. that were closed last week on Monday of this week. A large amount of new business is being closed daily despite the season. Prices remain unchanged and discounts to consumers in carload lots, Pittsburg, are as follows:

MERCHANT PIPE.

	In carloads. Blk.	Galvd.	Less than carloads. Blk.	Galvd
⅛ to ¼ inch and 11 to 12 inches	59.2	46.2	54.9	40.5
¾ to 10 inches	66.7	53.3	61.9	49.9

BOILER TUBES.

	22 Feet and under. Per cent. Iron.	Steel.
1 to 1¾ and 2¾ to 5 inches, inclusive	43½	63½
2 to 2½ inches, inclusive	43	60
6 inches and larger	53	59

CASING.

	S. and S. Per cent
2 to 3 inches	58
3¼ to 4 inches	63
4¼ to 12¾ inches	65

O. D. PIPE.

	Per cent.
14 to 22 inches	42
24 inches, o. d. and larger	37

THREADS AND COUPLINGS.

	Per cent.
14 to 16 inches o. d.	35

STRUCTURAL MATERIAL.—Contracts for the erection of a number of bridges are to be awarded within a few days requiring a tonnage of nearly 5,000. Mills are nearly all from two to three months behind on their deliveries and a large amount of new business continues to be placed. Prices remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—Demand for wire nails has fallen off considerably during the past week. Little new business in cut nails is being placed and the manufacturers continue anxious to close contracts for delivery during the next six months. Prices remain unchanged as follows: Single carloads of wire nails to jobbers, $2.30, Pittsburg; to retailers, $2.40; plain wire, carload lots, is quoted at $2.25 to jobbers and $2.35 to retailers; painted barb wire, $2.60, in carload lots to jobbers, and $2.70 to retailers; galvanized barb wire, $2 in carload lots to jobbers, and $3 to retailers. Cut nails are quoted at $2, Pittsburg, in carload lots, 2 per cent off in 10 days.

MERCHANT STEEL.—The demand for shafting is somewhat better than it has been for some time and contracts are now being closed by some of the machinery manufacturers for de-

livery during the next six months. Prices remain unchanged as follows: Turned, cold rolled and ground shafting at 55 per cent off for car lots and 50 per cent off for less than car lots; tire steel in carload lots and over, 1.60c; less than carload lots, 1.75c to 1.80c. Toe calk is held at 1.70c in large lots, and in small lots as high as 1.85c. Tool steel is held at 7c and upwards, according to quality; hoops and bands, 1.85c to 2c.

Old Material.—It has been practically decided that the United States Steel Corporation will purchase old material for all its plants through a purchasing agent to be located in Pittsburg. The big corporation has done little buying thus far, however, although a large tonnage will be required during the next six months. The market continues quiet. Our quotations, gross tons, are as follows: Heavy melting stock, $15.50 to $16; low phosphorus melting stock, $16.50 to $17.50; steel rails, $15.50 to $16; busheling scrap, $13.50 to $14; No. 1 wrought, $16 to $17; iron rails, $18 to $19; cast borings, $7.50; cast scrap, $13 to $13.50.

Coke.—Some low prices have been made on Connellsville foundry coke during the week, one contract having been closed at $2.20 for delivery during the next six months. Outside furnace coke is held at $1.50 to $1.75 per ton while Connellsville furnace is held at $1.75 to $2 per ton. Connellsville foundry coke is held at $2.20 to $2.35 per ton while the outside product is held at $1.50 to $2.15. The output of the Connellsville region for the week ending June 28 was about 230,000 tons. The shipments from the region amounted to 10,979 cars which was an increase over the previous week of 184 cars.

CHICAGO.

Office of *The Iron Trade Review*,
534 Monadnock Block July, 10.

The pig iron market this week may be characterized as a waiting one. Three weeks ago, there was a heavy inquiry for delivery in the last half, but the majority of this has been held up pending a settlement of the molders' demands. The result of the conference between representatives of the molders and founders which was held last week is still in doubt, the founders having until July 10 to accept or reject the final proposition of the molders. Until their action is known, it is scarcely expected there will be much buying. In view of the heavy inquiry which has been made, the business closed during the past week is light. Two or three 1,000-ton orders for malleable iron have been booked, but most of the trading is for small lots, sufficient to keep the foundries going until the uncertainty regarding the threatened strike is removed. Southern iron remains firm, local sellers stating that inquiry for about 8,000 tons having been made, 1,500 of which, for Southern coke No. 4, is from a Chicago concern. In most finished lines, the market remains as active as heretofore. All the mills of the Republic Iron & Steel Co. were started up Monday. Business in wire products is light, this being due to the hot weather and to the fact that most jobbers and hardware dealers take inventory in July, and also that the traveling men of the local manufacturers have been called in. The contract for the structural steel required in the erection of the addition to the Auditorium Annex Hotel has been let to the Carnegie Co., the specifications calling for about 1,600 tons.

Pig Iron.—Trading during the past week was confined almost exclusively to small lots, though two or three 1,000-ton orders for malleable iron were closed. The uncertainty regarding the molders' strike is mainly responsible for such light buying at this time of the year, and no change is expected until the foundrymen make known their decision regarding the acceptance or rejection of the proposition made to them by the molders' representatives at the conference held last week. Southern irons improve daily, there being inquiry for about 8,000 tons, 1,500 of which for Southern coke No. 4, is from a Chicago firm. We quote prices, as follows:

Lake Sup. Charcoal	$17 50 to $18 00	Southern Coke No. 4	$13 90 to $14 15
Local Coke Fdy. No. 1	16 00 to 16 50	Southern No. 1 Soft	15 40 to 15 55
Local Coke Fdy. No. 2	15 50 to 16 00	Southern No. 2 Soft	14 90 to 15 15
Local Coke Fdy. No 3	15 00 to 15 50	Southern Silveries	15 45 to 15 50
Local Scotch Fdy. No 1	16 00 to 16 50	Jackson Co. Silveries	17 00 to 17 50
Local Scotch Fdy No. 2	15 50 to 16 00	Ohio Strong Softeners	16 50 to 17 00
Local Scotch Fdy No. 1	15 00 to 15 50	Alabama Car Wheel	21 00 to 22 05
Southern Coke No. 1	14 65 to 15 15	Malleable Bessemer	16 00 to 17 00
Southern Coke No. 2	14 15 to 14 65	Coke Bessemer	17 50 to 18 50
Southern Coke No. 3	14 15 to 14 65		

Bar Iron.—All the local mills which were closed for a few days last week resumed operations Monday. There is no decrease in the volume of business being placed, one concern stating that last week was one of the best of the year, so far as tonnage booked was concerned. We quote prices at 1.55c to 1.65c for iron, and 1.60c to 1.65c for steel.

Structural Steel.—The Carnegie Co. has received the contract for the structural steel required in the erection of the addition to the Auditorium Annex Hotel, the specifications calling for about 1,600 tons. An excellent business is being done in small lots in territory contiguous to Chicago. Our quotations, mill shipments, carload lots, follow: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; angles, 1.75c to 1.80c; plates, 1.75c; tees, 1.80c; zees, 1.75c; small lots from store, ¼c higher; beams and channels from store, ½c per pound higher.

Sheets.—Orders continue plentiful, and mills report they are still unable to make prompt delivery. Warehouses report a heavy trade occasioned by the large stock they have on hand and their ability to fill orders promptly. Our quotations follow: No. 27 black, 3.40c to 3.50c, and galvanized 65 to 10 per cent from store and 70 per cent and 5 per cent from mill, Pittsburg.

Rails and Track Supplies.—The local seller reports it is not accepting orders for standard rails, except for small lots, such as it can fill when rolling the sections desired. In light rails and track supplies, an excellent business has been transacted, though all local sellers have their capacity sold from 60 to 90 days ahead. We quote prices, as follows: Standard rails, $28; light sections, $33 to $35, according to size; out of store, $40 to $44; splice bars, 1.60c to 1.70c; spikes, 1.90c to 2c; track bolts, hexagon nuts, 2.80c to 2.90c; square nuts, 2.65c to 2.75c.

Plates.—Manufacturers state a good business was closed, the orders coming from the general trade. Our quotations follow: Tank steel, 1.75c; flange steel, 1.90c to 2c; marine steel, 1.95c; firebox steel, ordinary, 2c to 2.10c; firebox, special, 2.25 and upwards. Tank steel from store, 1.90c to 2c; flange steel from store, 2c to 2.10c.

Merchant Steel.—Several concerns whose orders are never less than 1,000 tons are still waiting for a better market in which to buy. Business, however, has been fairly good, coming in the main from the general trade. We quote prices, as follows, mill shipments, Chicago delivery: Smooth finished tire steel, 1.90c to 2c; open-hearth spring steel, 2.50c to 2.75c; toe calk, 2.40c to 2.60c; sleigh shoe, 1.85c to 1.90c; cutter shoe, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards. Cold rolled shafting, carload lots, 55 per cent and upward.

Merchant Pipe.—There is no diminution in the volume of business, and manufacturers' prices are unchanged, as follows:

MERCHANT PIPE.

	Carload lots		Less than carload lots.	
	Black Per cent.	Galv. Per cent.	Black Per cent	Galv. Per cent.
⅛ to ¼ and 11 to 12 in	59.2	46.2	54.9	40.9
¼ to 10 inches	66.7	53.3	61.9	49.9

Wire and Wire Nails.—For the first time this year, the local seller has experienced a quiet week, attributed by it to the hot weather which has prevailed for several days and also to the fact that jobbers and hardware dealers take inventory in July. This temporary lull is not an unwelcome change, as it will enable the mills to catch up on deliveries. Prices remain unchanged, as follows: Carloads of wire nails to jobbers, $2.40, Chicago; to retailers, $2.50; plain wire, carload lots to jobbers, $2.35; to retailers, $2.45; painted barb wire to jobbers, carloads, $2.70; to retailers, $2.80; galvanized barb wire, carloads to jobbers, $3; to retailers, $3.10.

Old Material.—There is no change to be noted, the dullness that has prevailed for several weeks, continuing.

Dealers' selling prices per gross ton, are as follows:

Old iron rails	$19 00 to $19 50	Old Wheels	$16 00 to $16 50
Old steel rails, long	15 00 to 16 00	Heavy melting steel	13 00 to 13 50
Old steel rails, mixed	13 50 to 14 00	Mixed country steel	10 00 to 10 50
Relaying rails	20 00 to 22 00		

The following are selling prices per net ton:

No. 1 R. R. wrought	$14 00 to $14 50	Iron axles	$19 00 to $19 50
No. 2 R. R. wrought	12 50 to 13 00	Cast borings	4 00 to 4 50
Dealers' forge	12 00 to 12 50	Wrought turnings	9 00 to 9 50
No. 1 busheling	10 00 to 10 50	Iron axle turnings	10 50 to 11 00
Heavy cast	11 00 to 11 50	Steel axle turnings	9 50 to 10 00
Railway malleable	11 50 to 12 00	Stove plates	8 50 to 9 00
Country malleable	10 50 to 11 00	Old iron splice bars	16 00 to 16 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, July 10.

Some things have occurred this week which add strength to the vessel man's side of the iron ore carrying trade on the great lakes. The demand for tonnage keeps up but the supply has been curtailed by the appearance of some Chicago grain upon the market which is taking some of the boats, heretofore applicable to the movement of Lake Superior ore, into other channels. The docks, however, are able to handle only a reasonable per cent of the boats which have been carrying ore so that the weaning away of some tonnage will not affect the market materially other than permitting better dispatch to those boats which are still engaging in that trade. Still the slacking up of the supply without a corresponding abatement of the desire of the shippers to charter boats is having the effect of strengthening of the rates although without prospect or hope of an advance. The reports of the receipts of ore at the south shore ports were completed during the week just closed and show that the total for June was 3,373,833 tons against 3,149,952 tons for the same period a year ago. The total movement to July 1 for this season amounted to 4,963,608, against 6,415,840, during the same period last year. The June increase, therefore, was 223,881 tons while the showing up to July 1 is of a decrease from 1900 of 1,452,232 tons. Many shippers had expected a better showing on the June movement, but are not much put out by the returns. The rate of increase if continued will land them safely early in the fall, but the indication in the report is that more material will be moved after September 1 than the shippers had hoped for. If ore men have to divide tonnage with grain shippers during October and November some fancy rates are looked for. At present wild chartering is done on the basis of 80c from the head of the lakes, with a good demand for boats but poor dispatch.

PIG IRON.—Just now the pig iron market is a little quiet but with rich promises of better things for the future. The producers of foundry grades are peddling their material in small driblets of car load lots and less, but with not much of a demand for it at that, while most of the Bessemer demanded for the immediate future has already been purchased and new business in that line is not looked for at once. Basic, being sold up for some months ahead at the bigger stacks, is not the basis of any heavy buying hence just now the market is a little quiet. There are conditions in the foundry iron market which are very encouraging. Those who have contracts which do not expire until later in the season are now ordering ahead of them with the result that the furnaces are pushed to the limit of their capacity, which has been curtailed by a lack of workmen. The scarcity of labor has been due directly to the hot weather and has had the effect of both curtailing pig iron production and also of preventing that material which is on hand from being forwarded. The consumption keeps up to the pace established a few weeks ago and there are indications of permanency in this demand for material. While the orders therefore have not come in for this material they are expected in a short time and will bring with them a bracing of the market. Just now the tendency is for prices to sag some, the buyers having the upper hand. Some sales of foundry were made this week at $13.75. Most of the Bessemer Association furnaces are pretty well sold up for August and September and some of them well on into October. This condition has prevented any big contracts of late although moderate sales were made on the basis of $15.25, Valley furnace. The quotations remain as follows:

Bessemer	$16 00 to $16 25	Valley Scotch No. 1	$15 00 to $15 25
No. 1 Strong F'dry	15 00 to 15 25	Valley Scotch No. 2	14 50 to 14 75
No. 2 Strong F'dry	14 50 to 14 75	Gray forge, Valley	13 25 to 13 50
No. 3 Foundry	14 00 to 14 50	LakeSuperior charc'l	17 50 to 18 00

FINISHED MATERIAL.—The continued demand for structural shapes and the growing demand for bars are the features of the market this week. The Cleveland mills of the Republic Iron & Steel Co. and the bar producing plants of the Valleys opened on Monday, cutting short the shut-down this year to one week, because of the heavy ordering of material. The mills are still far behind with their contracts. This week orders were placed by the Upson Nut Co. and others for 5,000 tons of round bars. The price holds up at 1.40c on Bessemer and 1.50c on open-hearth, Pittsburg. The mills are not capable of handling all of the orders that come in on former contracts for structural material as some of the contractors are using far ahead of what the first requirements indicated. Aside from the building boom now in progress in the city, the American Ship Building Co. is taking a great deal of material for the new boats recently ordered. No orders for new material were placed this week, but further specification upon the big sale of $55,000 tons of plates and shapes recently, is expected soon to cover the Brown and the Richardson craft. The price on structural material holds up well. Plate prices show a slight tendency to sag although the evidences are all against any reduction of which a few rumors are afloat this week. The price holds up at 1.70c. Some fresh inquiry has been made for billets from the Union Rolling Mill, but the order has not been placed and may not be for several days as there is some question as to the price. Rails have ceased, for the time being, to be a factor in the market. Taking it all in all this has been a light week compared with what has just preceded.

CINCINNATI.

July 8

Rogers, Brown & Co. say of the week which has passed: "The intense heat and the holiday influences have not been sufficient to entirely check the demand for iron. Numerous inquiries have been received and early shipments have been desired. The lack of confidence in the future has led the business resulting mostly in small orders for quick shipment, which is a healthy sign. Instructions to withhold delivery on old orders are rare, but hurry requests are frequent. If these conditions continue during the existence of the strike and throughout the heated term, it is fair to presume that there will be an exceedingly lively demand later in the season.

"The softest spot in the market is Southern iron. Prices are irregular and some of the producers are apparently unnecessarily anxious for orders. The result is that special lots are to be had in a confidential way at bargain figures."

Matthew Addy & Co. in their weekly report refer to the trend of the market as follows: "Contrary to all precedent July is making a good showing. Ordinarily it is the dullest month in the year, but this year in spite of strikes and unusual heat it is marked by a really excellent tonnage of new business. The fact is that consumption has not flagged and consumers have no stocks on hand, so they must buy to continue running. The demand is of all kinds. There is the steady demand that has been so much noted during the past six weeks for small lots for immediate shipment; then there is a very fair inquiry for large lots for shipment over the last half of the year. During the week the demand has been wholly for foundry irons, the shutting down of the mills apparently having checked the call for gray forge.

"Business is going on at such a steady pace that it is difficult to say much more about it for trade is wholly devoid of any unusual features. We are simply having a better demand than is customary at this season of the year and the prospects ahead of us are exceedingly bright."

We quote for cash f. o. b. cars Cincinnati: Southern coke, No. 1 foundry, $13.75 to $14; No. 2 foundry, $13 to $13.25; No. 3 foundry, $12.50 to $13; No. 4 foundry, $12 to $12.25; gray forge, $12 to $12.25; No. 1 soft, $13.75 to $14; No. 2 soft, $13 to $13.25; Lake Superior coke, No. 1, $15 to $15.25; No. 2, $14.50 to $14.75; Hanging Rock charcoal, No. 1, $20 to $20.50; Jackson Co. silvery, No. 1, $15.50 to $16; Standard Southern car wheel, $17.50 to $18.50; Lake Superior charcoal, $18.50 to $19.

PHILADELPHIA.

July 9

The abnormally high temperature of the past week together with the general tendency of manufacturers to close their works during the week of the national holiday has not in the least helped to increase the amount of new business. This period of rest is, however, welcomed by employer and employe alike. It is now believed that the trouble between the Amalgamated Association and certain of the constituent companies of the United States Steel corporation will be only temporary, and will not assume any greater proportions. The

iron market continues in a very satisfactory condition when it is considered that at this season of the year trade is generally dull. Prices are in nearly all respects unchanged, and prospects, as far as they can be observed, are of the same reassuring character as for several weeks back.

PIG IRON.—While there have been a great many inquiries in the market, it is not known that these have materialized into any large orders. Even heavy consumers of pig iron are very conservative and order all kinds of material in relatively small lots. Prices remain practically stationary. We quote as follows for Philadelphia and seaboard delivery: No. 1 X foundry $16 to $16.25; No. 2 X foundry, $15 to $15.50; No. 2 plain, $14.50 to $14.75; standard gray forge, $14 to $14.25; ordinary gray forge, $13.50 to $13.75; basic (chilled), $14.25 to $14.50.

FINISHED MATERIAL.—The strike in the sheet mills has increased the inquiries for some products quite materially. The gains in the main being especially felt by the small makers. Bars are selling freely at quoted rates, and a number of consumers have entered the market to cover their wants for the last half of the year. The recent warm weather has had a tendency to limit consumption, but production has also suffered from the same source. Generally speaking, the market is strong and a large business is anticipated during the next few months. Current quotations are about as follows: Plates, ¼-inch and thicker, 1.75c to 1.80c; iron bars, 1.50c to 1.60c; steel bars, 1.60c to 1.70c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—There is very little demand for old material at present, and prices are somewhat irregular and uncertain. Dealers look for a revival as soon as the heavy consumers get through stock-taking, and the outlook for activity among the mills supports their view of the market. Bids and offers are about as follows for deliveries in buyers' yards: Choice railroad scrap, $18 to $19; No. 1 yard scrap, $14 to $15; No. 2 light scrap, $13 to $14; machinery cast, $13.50 to $14; heavy steel scrap, $16 to $16.25; old iron rails, $19 to $20; old steel rails, $15.50 to $15.75; wrought turnings, $11.50 to $12; cast borings, $8.25 to $8.75; old car wheels, $17 to $18; old iron axles, $21.50 to $22.50.

PROGRESS OF STRIKE IN SHEET AND HOOP MILLS.

At a conference held in Pittsburg on Monday evening between President Shaffer of the Amalgamated Association and representatives of the American Sheet Steel and American Steel Hoop Companies a conference was arranged to be held in Pittsburg on Thursday, July 11, for the settlement of the differences that have led to the strike. There is every indication that matters will be adjusted and that the strike will be declared off before the end of the week.

Although the strike has only been on about ten days developments were of such a nature during the past few days that a general strike at all union plants of the United States Steel Corporation seemed imminent. A general strike order of this kind would have affected all the plants of the American Tin Plate Co., several plants of the Illinois Steel Co. and several plants of the National Steel Co. The issuing of such an order, however, has been averted by the decision of both parties to hold a conference this week. The discharge of 12 employes at the Wellsville, O., plant of the American Sheet Steel Co. last week for the alleged reason of having attempted to form an Amalgamated Association lodge at the plant resulted in the issuing of a statement by President Shaffer in which he said that no conference would be held with the officials of either company until these employes had been reinstated. Whether they have been reinstated or whether this condition has been waived could not be learned.

Owing to the formation of this lodge at the Wellsville plant it is probable that even if the Amalgamated Association waives the clause providing for the signing of the scale for all plants of the American Sheet Steel Co., the signing of the scale for this plant will be insisted upon.

No effort has been made to resume operations at any of the mills of either of the two companies where the strike exists, and this enforced idleness is being utilized by the companies in making much needed repairs.

During the past week the scale for the ensuing year has been signed by nearly all of the independent manufacturers whose mills are operated under the jurisdiction of the Amalgamated Association. Never before have the manufacturers been so prompt in signing the scale and it is an indication that none can well afford a period of extended idleness owing to the large amount of business that is being carried on their books. Scales for one plant of the National Steel Co., for several of the National Tube Co. and for one of the plants of the Federal Steel Co. were signed during the week. These scales, however, were all local scales and applied only to the operation of certain portions of these plants.

The Amalgamated Association scale has been signed for the ensuing year by the following combinations and concerns:

The American Tin Plate Co., all plants.
The Republic Iron & Steel Co., all plants.
Standard Chain Co., Columbus plant, Columbus, O.
National Tube Co., Continental Department, Pittsburg, Pa.
Eagle Horse Shoe Co., Joliet, Ill.
The Empire Rolling Mill Co., Cleveland, O.
Pittsburg Forge & Iron Co., Pittsburg, Pa.
American Rolling Mill Co., Muskegon, Mich.
Southern Car & Foundry Co., Anniston plant, Anniston, Ala.
Helmbacher Forge & Rolling Mill Co., St. Louis, Mo.
The Niles Iron & Sheet Co., Niles, O.
Lake Erie Iron Co., Cleveland, O.
The American Rolling Mill Co., Middleton, O.
Brown & Co., Pittsburg, Pa.
Phillips, Nimick & Co. plant of the Crucible Steel Co. of America, Pittsburg, Pa.
Emlyn Iron Works, Emlyn, Ind.
The Tyler Tube & Pipe Co., Washington, Pa.
The N. & G. Taylor Co., Cumberland, Md.
Stewart Iron Co., Ltd., Sharon, Pa.
Sharon Tin Plate Co., South Sharon, Pa.
Wheeling Steel & Foundry Co., Wheeling, W. Va.
Kansas City Nut & Bolt Co., Kansas City, Mo.
Republic Iron Works of National Tube Co. Pittsburg, Pa., sheet bar mills.
Zug & Co., Ltd., Pittsburg, Pa.
The Waynesburg Forge, Sheet & Tin Plate Mill Co., Waynesburg, Pa.
Bessemer Rolling Mill Department of Tennessee Coal, Iron & Railroad Co., Bessemer, Ala.
Fort Pitt Iron & Steel Co., Pittsburg, Pa.
Mingo plant, National Steel Co., Mingo Junction, O.
Wilkes Rolling Mill Co., Sharon, Pa.
Bay View mill of Federal Steel Co., special scale signed.

At the plants of the Illinois Steel Co. in the Chicago district a special scale is in force which can be terminated by a 90-day notice from either party.

Combination of Vehicle Axle Manufacturers.

A combination of the manufacturers of vehicle axles, springs and axles for automobiles is being promoted by William G. Park of Pittsburg, and F. W. Parks, of New York, together with W. C. Fownes, J. Ramsey Speer and Charles McKnight of the S. Jarvis Adams Co., of Pittsburg, Pa. Options have been obtained on practically all the plants in the country including three in the Pittsburg district. Most of the options do not expire until November 1. If the combination goes through some of the plants whose cost of operation is high will be discontinued entirely and the machinery will be centralized in some of the larger plants. It is probable that the headquarters of the combination will be located in Pittsburg. Options have been secured on the following plants: S. Jarvis Adams Co., Pittsburg, Pa.; Liggett Spring & Axle Co., Pittsburg, Pa.; Keystone Axle Co., Pittsburg, Pa.; Sheldon Axle Co., Wilkesbarre, Pa.; Speer Axle Co., Wheeling, W. Va.; Cleveland Axle Co., Canton, O.; Lewis Spring & Axle Co., Jackson, Mich.; Higgins Spring & Axle Co., Racine, Wis.; Connersville Axle Co., Connersville, Ind.; Conrad Axle Co., Peacock, N. H.; Willis E. Miller, New Haven, Conn.; Dalzell Axle Co., South Egremont, Mass.; F. W. Wurster & Co., Brooklyn, N. Y.; Tomlinson, Newark, N. J.; Trenton Axle Works, Trenton, N. J.; American Axle Works, Philadelphia, Pa.; Thomas Insull, Philadelphia, Pa.; Dauphin Axle Works, Elizabethtown, Pa.; Standard Axle Works, Millersburg, Pa.; F. Gardner's Sons, Carlisle, Pa.; Hartford Axle Works, Dunkirk, N. Y.; Scranton Axle Works, Scranton, Pa.; Hay Axle Works, Coshocton, O.; Hess Spring & Axle Co., Cincinnati, O.; American Tubular Axle Co., Toledo, O.; Pontiac Axle Co., Pontiac, Mich.; Durant & Dorth, Flint, Mich.; Lee & Porter, Dowagiac, Mich.; Wood, Smith & Co., Chicago Heights, Ill.; Drummond Axle Co., Louisville, Ky.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trade, and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON AND STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

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PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Manager.

Subscription, $3 per annum. To Foreign Countries, $4.00. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

JULY 11, 1901.

THE STRENGTH OF THE AMALGAMATED ASSOCIATION.

In the past two or three years some good observers in the iron trade have made the prediction that the Amalgamated Association had but a few more years to live. The position the association has taken with the hoop and sheet companies now bids fair to bring out developments which will show the truth or falsity of these predictions. One thing is certain, and that is that the association has sadly degenerated from the position it once held. We refer not merely to membership and funds, but to wise management on the part of the officials and *esprit de corps* in the rank and file. The time was when the national administration had the hearty support and good will of practically all the members. The officials never stepped out of office unless they wanted to and re-elections were unanimous or nearly so. In the past two annual elections differences have developed and it is not so easy as formerly for the national officers to hold the men in line.

The position assumed by the Amalgamated Association in the contest it has inaugurated with the American Sheet Steel Co. and the American Steel Hoop Co. is generally condemned in the iron trade as unfair. In the circular addressed to the membership last week, it is admitted that the Old Meadow and Saltsburg mills of the sheet steel company are really non-union at the present time, the only claim that the company should sign for them being that they only became non-union recently, and "bad faith" is charged to the company. It would be just as fair for the company to charge bad faith upon the association when it attempts to organize a mill which has been left out of the scale signature, and strive to prevent the association from doing so by shutting down the union mills. It would be regarded as absurd for the company to try to bring such pressure to bear on the men, and it would appear equally absurd for the association to use what are practically the same tactics.

If we reverse the case as regards other parts of this circular the same absurdity appears. Thus the claim is made that inasmuch as the mills of the sheet steel company are combined the men should be permitted to combine, and that this right has been denied the men. The real point at issue is whether the company shall force the non-union plants into the Amalgamated fold. They are not denied the right to go in if they desire. That they do not so desire is shown by the fact that after the strike order the non-union men kept at work, and these non-union mills are all running. If it is fair for the Amalgamated Association to require the sheet steel company to force the organization upon its non-union plants, it would have been equally fair for the promoters of that company, having combined some of the plants, to require the association to refuse to work for outside mills, in order to force them into the combination also. It is needless to say the American Sheet Steel Co. was formed without asking or receiving the assistance of the men, and it is not denying the men any right which is enjoyed in its own organization.

It is a sad confession of incompetence on the part of the association's management if the workers in the non-union mills have been willing to join the association and have not been brought in. If they have not wanted to be organized, it would be an injustice to them for the company to force unionism upon them. We are inclined to believe that it has not been incompetence on the part of the Amalgamated management but unwillingness on the part of the men that has kept them out.

NO SYMPATHY STRIKE.

Since the starting of the strike at the union mills of the American Sheet Steel Co. and the American Steel Hoop Co., the members of the Amalgamated Association has been variously estimated in press reports at from 50,000 to 100,000. While the officials of the association would be glad if they could claim so large a membership, the correct figures show the association to be comparatively weak numerically. Since the Homestead strike the membership has never been above 20,000 and at present is between 16,000 and 17,000. It must be considered further that a large number of the members are employed in the 27 independent mills over which the Amalgamated Association has jurisdiction, and it is not probable that the total number of Amalgamated employes of the United States Steel Corporation will reach more than 13,000. It is estimated that for every skilled workman in a mill there are two unskilled, and on this ratio about 40,000 men would be affected by a strike at all the Amalgamated plants of the United States Steel Corporation. However no strike has been declared at the mills of the American Tin Plate Co., and as the number of men employed by the latter is estimated at 20,000, it can be seen that no more than 20,000 men are involved in the present strike.

Much has been said about tieing up all the mills of the United States Steel Corporation if the demands made in the present contest are not granted. None realize the impossibility of such a move better than the Amalgamated Association officials themselves. They not only know their weakness at the unorganized plants, but at the plants where labor organizations exist it is improbable that sympathy strikes would be declared. It has always been the policy of the associa-

tion to have nothing to do with sympathy strikes of any kind. The association assures a manufacturer when he signs a scale that the men working under it will do so until the expiration of the scale year, regardless of demands made upon them by other labor organizations to strike in sympathy. Within the past three months the association, much to its credit, has turned down two such propositions, one from the tube workers at Washington, Pa., and another at Reading, Pa.

After pursuing this policy for years toward other organizations it is not at all probable that the Amalgamated Association could induce the rod and mill workers in the mills of the American Steel & Wire Co. and the structural iron workers employed by the American Bridge Co., to go out on a sympathetic strike. In addition, the officers of the Amalgamated Association have taken the stand that they will not ask the assistance of outside labor organizations in carrying on this strike, contending that they will win out on the merits of their case.

ELEVEN MONTHS OF IRON AND STEEL EXPORTS.

Two movements are reflected in the statistics of iron and steel exports for May, 1901, and May, 1900, which are given below. The total for May of last year for the products which are reported in tons was 50 per cent greater than for May, 1901, and yet the figures for the 11 months ending May 31, 1901, are 295,000 tons or nearly 40 per cent greater than for the corresponding period of the preceding fiscal year. Last year May showed the beginning of sales abroad that in the second half of the year, after prices had gone down to a point which encouraged buyers to take hold again, mounted to quite respectable proportions. Significant differences in the May figures are those in pig iron, steel bars, billet sheets and plates. The total value of iron and steel products, including machinery, exported in May this year was $10,256,099, as against $12,026,681 in May, 1900. For the eleven months' periods ending with May they were respectively $109,485,143 and $110,038,875. The tonnage table follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES.

	Gross Tons.			
	May.		11 Mos. end'g May.	
	1900	1901	1900	1901
Pig iron { ferro	.....	.....	16	16
Pig iron { all other	19,585	1,569	144,001	252,621
Scrap	2,049	1,406	41,884	31,781
Bar iron	957	1,951	7,654	22,606
Wire rods	1,571	1,078	10,759	9,117
Steel bars (not wire rods)	6,670	1,599	22,853	75,577
Iron rails	1,854	503	6,119	1,780
Steel rails	43,772	42,040	300,325	341,683
Billets, ingots and blooms	4,690	686	9,569	120,930
Hoop, band and scroll iron	39	207	1,233	3,617
Iron sheets and plates	1,130	820	7,783	7,692
Steel sheets and plates	7,141	2,523	32,043	46,815
Tin plates, terne plates, and taggerts tin	8	16	131	599
Structural material	4,825	7,077	47,408	60,211
Wire	9,351	7,391	97,866	66,070
Cut nails	1,071	1,311	9,643	10,826
Wire nails	1,751	1,926	36,361	19,128
Other nails, including tacks	169	107	1,772	1,719
	106,636	73,144	777,480	1,072,798

THE REDUCTION IN PRICES OF SHEETS.

The reduction in the price of black and galvanized sheets announced by the American Sheet Steel Co. last week is not being met by the independent manufacturers. They are holding sheets at former prices for immediate delivery, and according to their own statements are closing business at the higher figure. There has been much speculation concerning this reduction at a time when nearly two-thirds of the mills of the American Sheet Steel Co. are closed by a strike. It has been intimated that it was made to keep the trade of the combine from deserting during the strike. There is nothing in this talk, however, as consumers will buy where they can get the goods at the best figure and only when material cannot be had will they pay a premium. Before the strike was declared at the sheet mills of the American Sheet Steel Co. the new list of prices had left the offices of the company, which seems conclusive evidence that the strike had no bearing whatever on the reduction. For nearly two weeks prior to the announcement the new list was being compiled with a view of equalizing the differential between prices for the lighter gauges of black plates and the prices for tin plate. Black plates, gauges 28 to 30, have been too high, in comparison with tin plate and this inequality has now been adjusted.

Puddlers Receive Advance.

(Special Telegram.)

PITTSBURG, July 10.—As a result of the bi-monthly examination of the bar iron sales sheets of the Republic Iron & Steel Co. and the American Steel Hoop Co. at Youngstown, O., today, the puddlers will receive an advance in wages of 37½ cents per ton, and the finishers 4 per cent for the months of July and August. The sales sheets showed an average selling price of 1.3 cents for bar iron for the months of May and June. This is the first settlement made under the new scale. The scale provides that on a 1.2 cent base, the puddlers are to receive $5 per ton. As the sales sheets showed a selling price one-tenth cent higher an advance was granted above the new base of 25 cents a ton. This settlement will only affect the Amalgamated workers in the mills of the Republic Iron & Steel Co. and the Independent bar mills for the present. As soon as the difficulty with the American Steel Hoop Co. is adjusted, it will also affect the workers in the hoop mills.

Will Not Increase Armor Plate Capacity.

Admiral O'Neill, chief of the Naval Bureau of Ordnance, gave out a statement in Washington this week to the effect that the construction of armored cruisers for which contracts have been let by the government requiring 37,000 tons of armor plate which will be furnished by the Carnegie Steel Co. and the Bethlehem Steel Co. will be seriously retarded, owing to the comparatively small amount of armor plate that is being furnished monthly by these two companies. At the present time he stated that about 400 tons of armor plate is being furnished every month, but this will be increased later to about 600 tons a month when improvements and additions at both plants are completed. At this rate he said it will require about six years to complete the ships, while he insists that they should be ready for service in three. He has written letters to both companies suggesting that they enlarge their plants in order that the output of both will reach about 900 tons a month.

It is not probable that the admiral's suggestion will be heeded by either of the two companies for the reason that the demand for armor plate is not always as large as it is at present from past experiences. Until this last large contract was received, the Carnegie Steel Co. was the recipient of contracts for only about 2,500 tons of armor plate from the government, and but for the contracts placed by foreign governments the plant would have been idle half the time. The same view is held by the officials of the Bethlehem Steel Co. and no enlargements will be made for the purpose of filling this one order.

At the Homestead armor plate mills improvements are being made in order that the present contract may be filled more expeditiously. The improvements consist of the erection of a new and the extension of the old annealing furnaces, so that they will be enabled to handle the larger plates called for in this contract. For the new ships plates will be made larger than have ever before been handled at Homestead.

THE MACHINISTS' STRIKE.

(Special Telegram.)

NEW YORK, July 10.—The situation in New England is improved and there are indications that a few days will wind up the strike. In New York and nearby points condition favorable to resumption of work at an early date; the strike is broken at Newburgh and former employes applying for reinstatement. The strikers return without concessions at Scranton and this week 75 men returned to work in Cincinnati on manufacturers' terms.

General reports from Illinois and Indiana show general collapse of strike. Many shops running with full complement of hands, others adding men daily. At Minneapolis the strikers are returning singly and in small groups. The administrative council of the National Metal Trades Association have unanimously rejected the terms submitted by President O'Connell for settlement of questions involved in the strike.

Machinists' Association Submits Modified Terms.

Monday, July 8, the National Metal Trades Association rejected a proposition made by James O'Connell, president of the International Association of Machinists, as a basis for settlement of the strike of the machinists. The proposition, which was submitted to the National Metal Trades Association through R. M. Easley, secretary of the National Civic Federation, and signed by O'Connell, was as follows:

"First—The question of wages to be arbitrated by districts the arbitration board to be composed of three parties from each side, an umpire to be mutually agreed upon by the arbitration board.

"Second—All machinists on strike to be reinstated without prejudice to their former positions pending the settlement by arbitration.

"Third—The hours of labor shall be 54 hours a week, which is not submitted for arbitration.

"Fourth—The award of the Arbitration Board is to date back to the time the men return to work.

"Fifth—Articles of agreement shall be signed by both sides agreeing to the above basis of arbitration.

"The above basis for a settlement of the present strike shall not apply to firms, members of the National Metal Trades Association and others with whom we have made settlements."

O'Connell in this proposition recedes from the position he took before he ordered the strike. The position he then took was that the wages must be fixed or agreed on by the national body. The proposal which the National Metal Trades Association now rejects the employers would have been willing to accept before the strike was ordered, as it was practically embodied in the agreement which was violated in the ordering of the strike.

Picketing Under the Ban.

Judge Phillips, of the United States district court, who last week issued a temporary injunction enjoining the striking machinists at the Riverside iron works, Kansas City, from interfering or intimidating that company's employes, has defined to some extent the limit to which the strikers may go in their efforts to induce men not to take their places.

"We would like to know," argued the strikers' attorney, "whether the defendants can talk to the men, who take their places, while they are on the street."

"We will not discuss the question as to what constitutes moral suasion at this time," replied Judge Phillips. "If any of these men picket the workmen who go to and from this plant, I shall consider it a physical demonstration calculated to intimidate."

A similar case has been treated on almost identical lines by Judge Wing, in the United States Circuit Court, Cleveland, July 8, in reference to the picketing of the Otis Steel Co. The judge in giving his decision said:

"Picketing is an organized espionage made for the purpose of carrying out the edict or injunction of a self-constituted body. Picketing in itself is a menace, and is an indication of war. It is a means used to enforce the mandate of a union. Every man has a right to do as he pleases as long as he does not interfere with the same right of others."

The decision of Judge Wing is one of great interest to union labor, as well as to employers, for it attacks the methods employed by union men in conducting strikes. The posting of pickets about a shop against which a strike has been declared has proved to be an effective method of carrying on the fight between employers and employed. Judge Wing said that the system, even though it was not accompanied by violence, would do evil.

The defense of the molders was that no violence had been attempted or perpetrated, and several policemen who had been detailed to accompany the non-union men to and from the works corroborated these statements. The judge referred to the absurdity of the expense incurred by the company in boarding and caring for their employes within the walls of their shop, and the payment of exorbitant wages to these men, to say nothing of the men themselves electing to pass their entire time within the walls of the shop, and never leaving them without an escort, if there was no element of intimidation in the presence of the so-called pickets. Continuing, the judge said:

"There has been no violence in this instance, but perhaps the reason there has been none is because the non-union men stayed within the shop. The purpose of the pickets is to create a feeling of fear by keeping on the non-union men the eye of a large body of union men. By this means, then, it was hoped to enforce the mandatory injunction of the union. It is the business of no man to dictate to another what his conduct shall be, and enjoin by means of intimidation."

The court declared that workingmen had a perfect right to form unions, and that the courts could not say whether a man must work for an employer or not, or that the employer must employ certain ones. Whether the principles of unions were sound or unsound was not a material point, he said, but they had a right to them, and to promulgate them by persuasion. He held, however, that these organizations had no right to enforce these beliefs. The trial of the case consumed three days and the legal questions raised were of much moment. The judge explained that the injunction was binding on every member of the union whether or not personal service was obtained on each one.

A lawsuit to test the liability of the individual members of a union, has commenced in Dayton, O., the Dayton Mfg. Co. having filed a petition asking for $25,000 damages from Metal Polishers' Union, No. 5. It is claimed that during the trouble at this shop, from October 9, 1899, to May 14, 1900, the discharged union men interfered with the operation of the plant and the new workmen to this extent. The company recently was granted a permanent injunction against the union in regard to such conduct as picketing or boycotting, etc., and the above action is doubtless based upon the language of the judge granting the injunction.

Henry F. Devens, secretary of the National Metal Trades Association reports that the machinists and helpers who went on strike at the A. & F. Brown Co.'s works in Elizabethport, have returned to work under the conditions which existed before the strike.

A meeting of the Finance and Strike Committee of the National Metal Trades Association will be held in New York the end of this week to consider the strike situation.

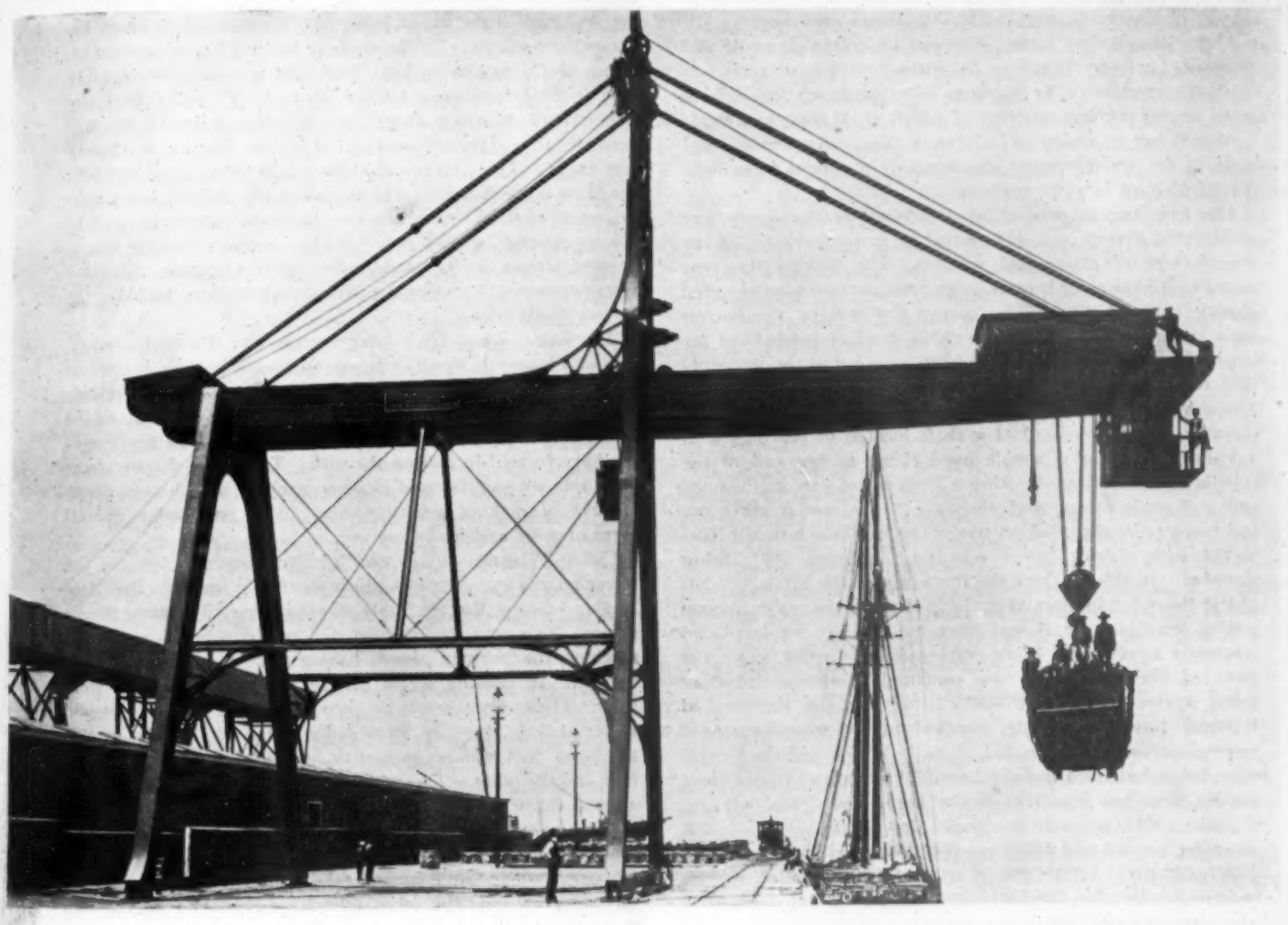
Two hundred machinists are reported as having returned to work at Newark, N. J., on the basis of nine hours a day at a nine-hour wage rate. The workmen originally ceased work May 20 in the hope of obtaining a nine-hour day at a ten-hour wage rate.

Some discussion is aroused by the fact that the places of a number of the striking machinists on the Southern Railway, Georgia, have been filled by machinist-students from the State School of Technology.

At a meeting of the board of directors of the Allis-Chalmers Co. held in New York last week it was decided to invest $1,250,000 in a new engine plant on the Atlantic coast. President W. J. Chalmers is reported to have made the following announcement: "I cannot say at present where the shops will be located, since negotiations for the proposed site have not been completed. They will be where shipping facilities are within easy access, however. It will be a great saving on freight rates in foreign shipments. We can also get our material from Pittsburg more easily. In Chicago we have been unable to secure protection even from the courts in time of labor troubles."

LARGE GANTRY CRANE AT NEWPORT NEWS.

The Wellman-Seaver Engineering Co., of Cleveland, has designed and built for the Chesapeake & Ohio Railroad Co., at Newport News, Va., a gantry crane of very large capacity. The crane has a folding jib, and its principal duty will consist in the loading of heavy articles, such as locomotives and their tenders on board ships lying alongside of the wharf upon which the crane is located. At present the crane is erected upon a wharf of timber construction, but it is the intention in the near future to move the crane to another wharf, which will be provided with tracks upon which the crane will traverse. At present, however, the crane is anchored down to a pier. The projecting end of the jib is so arranged that it can be lifted up out of the way of the funnels and masts of the ships. The load can be picked up from the wharf and traversed out through the legs of the crane and placed on board the ship. The crane has a lifting capacity of 60,000 lbs. on the main hoist and 20,000 lbs. on the auxiliary hoist. It is operated by means of electricity, and all of the gearing is provided with housings and covers to protect it from the weather. This crane is one of the numerous improvements now being made by the Chesapeake & Ohio Railroad Co. at Newport News, Va., and will add largely to the shipping facilities at that port.



GANTRY CRANE ON DOCKS OF CHESAPEAKE & OHIO RAILWAY CO., NEWPORT NEWS, VA.

The Brown Hoisting Machinery Co. of Cleveland, has been awarded a contract for two complete coal handling plants, which will be installed at the Wakamatsu Harbor of the Kiu Shu Railway, Japan. These plants will each be capable of handling a ten-ton load, which is equal to a combined daily capacity of 5,000 tons. They will mark the first serious introduction of coal handling machinery into the far East, and are valued at nearly $100,000. The Brown Co.'s engineers will erect the plants in Japan.

The Stilwell-Bierce & Smith-Vaile Co. of Dayton, O., recently shipped to the North Carolina Electrical Power Co., Marshall, N. C., one of its 27-in. improved cylinder gate Victor turbines mounted on a horizontal shaft in a wrought iron flume. The wheel was made entirely of bronze and under 60 ft. working head of water will develop 750 h. p. This power will be used for driving the plant of one of the street railway companies in Ashville, N. C. The shipment also included 70 feet of steel feeder pipe, three sets of head gate irons and the necessary water rack.

What the Chemist Has Done for Iron.

In the matter of supplying the engineer with suitable constructive materials, the most striking case is that of the introduction of cheap steel of varying qualities in substitution for costly steel and other less suitable forms of iron. The original production of Bessemer steel from the pure Swedish cast iron was undoubtedly suggested by accurate chemical analyses which showed the relative chemical composition of cast iron, wrought iron and steel. The process owed its original suggestion, as well as its salvation from failure, to the chemical knowledge which was supplied to those who were interested in the procedure. But it further owed the extension of its application to all the commonest, cheapest and most abundant kinds of impure English cast iron to the further utilization of chemical knowledge and suggestion, for Messrs. Thomas and Gilchrist proved that the British pig irons could be converted into good steel if they were treated by the Bessemer process in the presence of basic substances such as lime and magnesia, since under these circumstances their phosphorus was eliminated. At the present time the metallurgical chemist and the chemical metallurgist are engaged in furnishing metals and alloys, new to commerce, which can rank in importance with cheap steel, only in a somewhat minor degree; and the engineer in every department of his activity is now continually having placed at his disposal alloys which are more suitable for his various designs than any which he has hitherto employed.—[Prof. Frank Clowes, Institution of Civil Engineers, London.

DEVELOPMENT OF THE WOOD SCREW.

A very interesting paper giving the history of the wood screw, which has been for so long a prominent article of manufacture at Providence, R. I., was read recently before the Providence Association of Mechanical Engineers by Chas. D. Rogers. Mr. Rogers was for many years with the American Screw Co. and is now identified with the Rogers Screw Co His address was as follows:

The origin of the gimlet point on a wood screw is not known, but the invention has been claimed for many individuals. It certainly was in use in 1758, for there is a piano at Smith College, Northampton, Mass., inscribed in that year, which contains gimlet pointed wood screws. Tapered screws resembling somewhat the common gimlet point were made by the Poughkeepsie Screw Co., of Poughkeepsie, N. Y., about the year 1836, and the Mechanics' Institute of New York City awarded that company a diploma for such screws at about that date. These tapered screws went out of use because of their tapering body or core, which made them work loose in articles or structures subjected to vibration or movement.

Almost numberless forms of screws have been invented and patented, but were found to be without utility, or were too costly to produce. The material now employed for making wood screws is commonly that of a high grade Bessemer steel; homogeneous in structure and free cutting. An almost ideal material for screw-making was formerly produced from light scrap iron sunk in a charcoal fire.

The first manufacture of wood screws by machinery was probably in France, and was carried on in connection with the manufacture of clocks and watches. The makers then engaged in it have since become large producers of what is called French stamped ware. The presses for making the barrels for containing the springs of watches were probably used for heading screw blanks and are said to have led to the introduction of a header specially designed for their manufacture. These blanks were threaded in what is known as a French threader, which consisted of a shaft located in bearings with a leader screw and a simple hand clamp at one end of the spindle and a crank at the other. Then a tool post was erected and was made to approach the axis of a screw at every cut and traverse its threaded portion. The machine was also furnished with a back rest supporting the blank while being threaded. In this machine the threading of the blank was begun at the point, in place of at the heel—as in all present screw cutting machinery—and was operated entirely by hand, no automatic attachments being employed. For many years the so-called French threader was commonly used for threading wood screws. Soon after the war of 1812 the Piersons of Ramapo, New York State, engaged in the manufacture of screws in connection with that of nails. They used the French threader and claimed to have improved it somewhat. In their employ were two ingenious mechanics named Crum, who invented partly automatic machinery for shaving, nicking and threading screws, and following this period, wood screws were principally made by the use of four machines, header, shaver, nicker and threader, the latter employing a cutting die instead of a chasing tool. The shaver consisted originally of a single spindle in which the blank was inserted by hand, and the shaving tool was brought up also by a hand lever. The nicking in the head was done by placing the blank between two roulette plates with the axis of the two set at a slight angle. These were continuously revolved. The blank was placed in the top of these roulettes by hand. The saw for nicking was on a level with the axis of the roulette, consequently the faces of the two plates approached each other and clasped the blank as it approached and passed the saw, the saw being made adjustable to give the nick the proper depth. The nick produced in this case was slightly convex. These roulette feeds and jaws were afterward improved so as to be intermittent and the saw was drawn forward and back by a cam motion which made the bottom of the nick concave, that is, deeper in the middle. As the roulette revolved, the faces of the plate separated and the slotted blank was released. Similar machinery to this was used by the old Providence Screw Co. and about the year 1838 that company licensed the Eagle Screw Co. to use its processes. The latter was sued by the Piersons of Ramapo for infringement of Crum's patents and a judgment was obtained against the Eagle Screw Co. that, with expenses of litigation, amounted to nearly the whole amount of its capital. The shareholders of the Providence Screw Co. being held personally liable for these damages under their charter were compelled in large part to make the amount good.

The old "James" blunt pointed screw, once so generally used in this country, was manufactured in Birmingham, Eng. The company was afterward absorbed by the Nettlefolds of the same city. Screw blanks furnished by the Scotch "nailers" were used by the earliest British makers of wood screws. The heads and shanks were trimmed by screw makers with a coarse file and the former probably was nicked by a hand saw. The earliest samples would indicate that the threads were filed, but later on they had the appearance of being threaded with a die. It was entirely hand work and of course the points were blunt.

In the employ of the Messrs. Pierson at Ramapo, N. Y., was a noted inventor, General Thomas W. Harvey, who later invented the first automatic shaver, nicker and threader. These were three separate machines, but all were strictly automatic. He also applied the toggle-joint motion to a header, which increased the efficiency of the machine for heading screw blanks. Some of his machinery was built and put into use, notably that at the Utica Screw Co., of Utica, N. Y., which company went out of existence about the year 1860, and with this experience, in all probability the use of the Harvey machinery was ended. This Harvey machinery was constructed to make the blunt-pointed screw and later, when Mr. Rogers was superintendent of the Utica Screw Co., he made changes in it needful to produce gimlet points. The company having blunt-pointed screws on its hands, which were unsalable, machines were arranged for gimlet-pointing them, thus making the screws marketable.

The Eagle Screw Co.'s later success was due to the adoption of Thomas J. Sloan's inventions, now substantially used in this country and abroad. The Sloan inventions were mainly in the combining of the shaver and nicker, to which he added a subsequent process—that of reshaving the head to remove the burr formed in cutting the nick. The Sloan threader was an automatic pointing and chasing machine, and therefore was capable of making gimlet points. Sloan patented a special form of point and heel of screw.

Cullen Whipple, an inventor of Providence, elaborated the French threader, and with the use of this machine the New England Screw Co., on Eddy street in this city, made gimlet points. This was easily done, the machine being a chasing machine, the "former" simply having to be changed to produce a point. In chasing screw threads formerly two tools were used. These were combined into one under a patent issued to Kendall & Hunt, of Providence. One of the ribs of this threading tool was made with a beveled face to produce the heel and the point. The other rib, with its face parallel to the axis of the screw, formed the cylindrical portion between the heel and point. It was thought to be necessary to have this tool to produce the Sloan screw, owned by the Eagle Screw Co. This resulted in one company (the Eagle) owning the patent on the screw, and the other (the New England) on the tool for manufacturing it. The consolidation of the Eagle Screw Co. and New England Screw Co., in the year 1860, harmonized all differences between the two companies. A single tool is now used for cheapness of manufacture and the facility with which it cuts, and is a compromise between the two faces of the double tool just mentioned. A screw produced by it was patented by William Whiting of this city, who, in connection with the late George F. Wilson, started a screw factory in New Bedford, which was afterwards absorbed by the Union Screw Co. of Providence.

The rolling, swaging or forging of machine screw threads has been employed many years with comparative success, but efforts have been made in this country since 1830 to produce a suitably rolled gimlet pointed wood screw. The main difficulty seemed to arise from the extra displacement of stock. Efforts were made many years ago by Mr. Harwood, of Utica, N. Y., and by many others who have spent considerable sums of money in machinery and in efforts to produce a rolled wood screw, but they were all abandoned as impractical. Later on Hayward A. Harvey (the inventor of Harveyized armor plate) made experiments in that direction with

indifferent success, but from 1879 to 1885, after the introduction of homogeneous material, he attained partial success after encountering many difficulties. His rolling dies consisted of an inner circular die and an outer segmental die. The shape and form of the screw threads were made upon these dies, but the outer or segmental die being of larger circumference than the inner, there was a "quarrelling," producing imperfect threads. Then, the angle of the rib of the die at the beginning was more obtuse than at the finishing end. This was a detriment to the complete formation of the thread. Harvey also developed the depth of the thread by gradually increasing the penetration of the ribs of the die into the screw blank. The gradual penetration, of course, produced an elongation of the body of the blank. This elongation was not uniform and it was detrimental to the formation of a good point as there was no certainty of the point's being supplied with the requisite amount of metal to form a full thread; therefore the finished points were of a very uncertain quality. His thread was formed by the union of two sheets and consequently was not a solid thread. These processes and machinery were patented by Mr. Harvey and sold in this city and in England for a large sum of money. The American Screw Co. in its efforts to produce screws by Harvey's process, discovered the obstacles that prevented its complete success. To overcome the difficulties existing, it was found essential that the two dies forming the screw should be on their faces flat and the ribs of the dies should correspond exactly with each other. The faces of these dies were adjusted to correspond with the diameter of the core of the finished screw. The ribs of the die entered the screw blank at once to their full depth and as the dies reciprocated in movement, the blank being revolved, the gradually widening faces of the ribs of the dies forced the metal to flow laterally into the groves of the die, producing a solid thread and in an average size of screw increasing the diameter of the threaded portion of the body about three numbers screw gauge over that of the cut thread screw. It will be readily seen from the immediate penetration of the die to its full depth into the blank, that there was no subsequent pressure brought upon the core of the screw, consequently there was no elongation to conflict with the development of the thread. There had been many efforts made to produce dies with diverging ribs, to compensate for the elongation of the blank, but as that elongation was an uncertain quantity, they were failures. The point of the screw being a cone and much smaller than the body, had in a measure to be dragged through the die, consequently certain conditions had to be met not easily described.

The difference in the construction of the Harvey and all other dies and what is known as the Rogers die was the cause of extensive litigation in London, England, between the Nettlefolds of England and the American Screw Co. The presiding judge in his decision, remarked in effect that the invention of Rogers consisted in "initial penetration" to the full depth of the thread, which was novel.

In addition to the rolling processes mentioned forging machinery had to be invented for the purpose of uniformly forming the head and increasing its size to correspond with the increased diameter of body and of nicking and pointing the screw blank at one operation. By this screw making was limited to two machines in the place of four, and the cost of manufacture was materially decreased, through rapidity of production and the saving in material, the later being about 40 per cent. In addition to the above, the rolled screw has a decided advantage in strength and uniformity, its torsional strength being 50 per cent greater than that of the cut screw. This holds good for both the headed and the threaded portions as all the original skin of the metal is preserved and condensed by the rolling process. This screw is superior for all work where an extra finished head is not required.

Mr. Rogers mentioned another screw which has not been brought out in this country to any great extent, and that is termed the drive screw. There is a field for its use where cheapness and quickness of handling make it desirable. It is driven by a hammer, like a nail, and revolves on its axis, screwing itself into the wood like an ordinary screw. It can be withdrawn by the use of a screw driver. Not much effort has been made to place this article on the market, as the price of common screws has usually been so very low that there was little inducement for buyers to look into its merits. In England, however, one concern alone is making four tons per day of these screws, and is shipping them to all parts of the globe. They are mostly used on metal cornices, sheet metal roofing and similar work.

One important result of the Rogers inventions has been the possibility of making cheaply a small neck or shank, avoiding the use of two bits in hardwood and which other inventors, by large expenditures of money, have vainly endeavored to cheaply produce. As to the commercial value of these processes, the American Screw Co. paid $150,000 at the outset for the Harvey patents, with no expectation of using them, but simply to cover the business. Since then hundreds of thousands of dollars have been spent for forging patents and machinery.

A committee of shareholders of the American Screw Co. (consisting in part of such well-known men of this city as John W. Vernon, Charles Alexander, Herbert J. Wells and Charles B. Humphrey) said in their report of 1898 regarding these inventions: "Today the validity of the patents is unchallenged in this country and in Great Britain, where the Rogers patents were stubbornly contested by the Nettlefolds, the courts of highest resorts have established them beyond cavil. Some years of practical test have now confirmed their commercial value, so that at present more than one-half of the screw product of the company consists of screws made by the swaging or forging process, whereby a large product of a better quality is produced at a less cost than can be secured by the old cutting process. These patents are now regarded as one of the most valued assets of the company, and would not be sold for a much larger amount than they cost."

More than 100 screw companies have been in operation in this country, and only a few have met with success. During the last 25 years the price of wood screws has declined from 55c. to 9½c. per gross. Just prior to the boom of 1899 and 1900 it went down to 7½c., but the abnormally high prices of the past two years have enabled many of the small makers to become well established.

It is interesting to note that at the present time English screws are sold in Great Britain at about 15c per gross, the comparatively high price ruling there being, in a measure, due to the fact that the makers in the different countries produce their screws on different models. The prejudices of English consumers induce them to pay a much higher price at home than the English screw makers get for export, and this serves as a better protection to the English maker than would a moderate customs tariff.

Receiver Harold J. Gross of the Phenix Iron Foundry Co. of Providence, R. I., last week disposed of the greater portion of the real estate holdings of the company in the interest of the creditors. Nearly $100,000 was realized on the sale which will permit him to pay the creditors in full. It is believed that the sale of this property will shortly result in the discharge of the receiver and the company will be permitted to continue operations again under its former organization. According to the reports of the receiver the business of the foundry has been very profitable during the past few months.

The following official statement was given out last week by the United States Steel Corporation: "Apparently some misunderstanding has arisen in the minds of holders of the shares of stock of the United States Steel Corporation concerning the term intended to be covered by the dividends declared at the last meeting of the board of directors. The dividends were intended to be quarterly dividends, covering the quarter ending June 30, 1901. The reported earnings of subsidiary companies for this quarter, of course, are in excess of the amount of these dividends."

The cold rollers at the Humbert plant of the American Tin Plate Co., at Connellsville, Pa., struck for an increase in wages amounting to 10 per cent last week. The other employes of the plant who are members of the Amalgamated Association are taking no hand in the trouble.

EFFECTS OF VARIATIONS IN MANGANESE ON DIFFERENT GRADES OF IRON.

BY THOS. D. WEST.

The results shown in Tables 1 and 2, obtained from a wide range of experiment, verify some of the properties attributed to manganese, and, the writer believes, amplify our knowledge of its effect on cast iron considerably. We will first outline the method of physical testing followed in this work. The breaking strength and deflection given in columns 3 and 4, Table 1, are each the average of about four tests. Two of the tests being from 1⅛ inch round bars cast on end, and two from 1 inch square bars cast flat and used for obtaining the contraction and chill. All bars were tested 12 inches between supports.

The contraction tests recorded in column 5, Table 1. were obtained by casting square bars A and B in a frame C, Fig. 1. The contraction was measured by a graduated wedge D, the thickness of the point at which it settled between the bars and frame being measured by a micrometer, as at V, Fig. 4. The bars were 1 inch square by 24 inches long and poured by top gates, as shown. The chill was obtained by breaking off a piece at the ends as shown at E, Fig. 4.

To obtain the hardness tests, the writer arranged a drill press, as shown in Fig. 2. A bicycle cyclometer was attached to the upper body of the frame, at F, and then a light sheet iron ring was bolted to the upper shaft G, with an arm as at H. This arm came in contact with the cyclometer at every revolution of the shaft G, and recorded the exact number of revolutions made in a stated time by a watch held in the hands of the operator, as seen at I. In order to apply a constant pressure of the drill J on the test piece K, a weight L was suspended from the lower arm M, by a wire, at a given distance from the end, as shown. Three revolutions of the shaft G equalled two of the drill. The machine could be stopped in a second by a lever at M. The same ½-inch drill was used for all tests, testing the softer specimens first, and the harder ones last. The drill was kept of a uniform sharpness for the bars of each cast. The drill ran 60 seconds for each test and the speed of the shaft G varied from 35 to 37 revolutions. An average of 36 revolutions was allowed in computing the depth of the holes made in 60 seconds and recorded in column 7. The tests obtained by this drill press proved very satisfactory. To obtain the depth of the hole a wooden pin O, Figs. 3 and 4, was set into the drilled holes, as seen at P, and a steel pin R, pressed into the wooden pin on a level with the top of the test specimen, as shown at R. After the pin O was removed it was set on a level clean surface, a wedge T passed along until it was stopped by a pin, as at U. The distance the wedge passed under the pin U was measured by a micrometer as at V, Fig. 4. The depth of such holes could also be measured by filling them with water and measuring it with a small graduate as at W, Fig. 4.

The structure, column No. 8, is given merely to denote distinctions as made by the eye in judging the relative size of the crystals or grain of the fracture. For example, No. 2 stands for what would be expected of the grain in a piece of true No. 2 iron, and so on up with closer iron in the higher numbers.

The iron was melted in the twin shaft cupola, seen in Fig. 5, the operations of which have been explained by the writer in previous papers. The use of such a cupola seems to be the most reliable way of making comparative tests on work which involves delicate observations, and presents the remarkably uniform conditions of fuel, blast, heat, etc., necessary to discover the true effects of changes in the elements composing cast iron. The fact that the tests in Table 2 were obtained with the use of the cupola, Fig. 5, gives the writer greater confidence in the results shown than he could place in any others obtained in the ordinary way of making separate comparative tests, that is, having one taken off one day and another some other day, with the differences in fuels, blast and heat conditions that usually exist in making heats in ordinary cupolas.

TABLE 1.

	1 No. of test	2 Iron used.	3 Breaking Strength.	4 Deflection	5 Contraction.	6 Chill.	7 Hardness.	8 Structure.
Heat No.1	1.n	Foundry pig.	2,169 lbs.	.107"	.180"	None	.572	4
	2.	Mn. in cupola	2,268 lbs.	.110"	.331"	None	.122	5
Heat No.2	3.	Foundry pig.	1,715 lbs.	.101"	.198"	None	.625	5
	4.	Mn. in cupola	1,808 lbs.	.082"	.237"	Slight	.415	5
Heat No.3	5.	Charcoal pig.	1,510 lbs.	.075"	.276"	None	.438	3
	6.	Mn. in cupola	1,822 lbs.	.090"	.291"	None	.410	4
	7.	Mn. in cupola	1,654 lbs.	.072"	.315"	.025	.248	5
	8.	Mn. in ladle.	1,577 lbs.	.077"	.284"	None	.506	2
Heat No.4	9.	Foundry pig.	1,428 lbs.	.101"	.125"	None	.730	3
	10.	Mn. in cupola	1,690 lbs.	.102"	.204"	Slight	.600	5
	11.	Mn. in ladle	1,763 lbs.	.083"	.161"	None	.705	4
Heat No.5	12.	Foundry pig.	1,652 lbs.	.105"	.216"	None	.553	3
	13.	Mn. in cupola	2,269 lbs.	.130"	.360"	Slight	.107	6
	14.	Mn. in ladle	1,995 lbs.	.100"	.229"	None	.532	4
	15.	Mn. in ladle	2,016 lbs.	.100"	.246"	None	.578	4
	16.	Mn. in ladle	2,122 lbs.	.095"	.279"	Slight	.490	5
Heat No.6	17.	Foundry pig.	1,888 lbs.	.100"	.309"	None	.347	3
	18.	Mn. in cupola	1,794 lbs.	.097"	.320"	None	.282	3
	19.	Mn. in cupola	1,845 lbs.	.080"	.330"	.062	.204	3
	20.	Mn. in ladle	1,970 lbs.	.102"	.309"	None	.314	3
Heat No. 7.	21.	Charcoal pig.	2,355 lbs.	.095"	.339"	.128	.385	7
	22.	Mn. in cupola	2,331 lbs.	.090"	.348"	.166	.244	7
	23.	Mn. in ladle	2,394 lbs.	.100"	.341"	.055	.450	5
	24.	Mn. in ladle	2,310 lbs.	.102"	.340"	.040	.418	5
Heat No.8	25.	Bessemer pig	1,701 lbs.	.125"	.226"	.300	.420	3
	26.	Mn. in cupola	1,497 lbs.	.055"	.242"	All	White	White
Heat No. 9	27.	Charcoal iron.	1,570 lbs.	.052"	.401."	1.375	.040	Mottled
	28.	Mn. in cupola	1,082 lbs.	.046"	.427"	All	White	White
	29.	Mn. in ladle	1,772 lbs.	.100"	.326"	1.100	.242	3
	30.	Mn. in ladle	2,066 lbs.	.095"	.322"	.30	.222	3

TABLE 1.

9 Sil.	10 Sul.	11 Mang.	12 Phos.	13 C.C.	14 G.C.	15 Total C.	1 No. of test
4.53	.025	.52	.194	.06	2.98	3.04	1.
4.40	.018	6.12	.178	.28	2.61	2.89	2.
4.31	.031	.48	.203	.07	3.19	3.26	3.
4.41	.023	2.62	.198	.23	3.01	3.24	4.
4.45	.110	.41	.213	.03	3.06	3.09	5.
4.31	.067	1.09	.210	.05	3.10	3.15	6.
4.30	.032	4.09	.192	.16	3.09	3.25	7.
4.52	.108	.51	.211	.03	3.05	3.08	8.
3.92	.034	.44	.164	.06	3.35	3.41	9.
3.88	.029	1.08	.156	.19	3.16	3.25	10
3.88	.029	.76	.162	.08	3.29	3.37	11
3.88	.031	.49	.194	.09	3.06	3.15	12
3.53	.020	3.53	.152	.30	2.87	3.17	13
3.82	.026	.68	.193	.11	3.22	3.33	14
3.62	.025	.87	.191	.11	3.39	3.50	15
3.74	.023	1.18	.192	.10	3.03	3.13	16
2.47	.030	.97	.255	.42	3.44	3.86	17
2.40	.022	2.26	.250	.43	3.38	3.83	18
2.41	.022	3.71	.231	.47	3.25	3.72	19
2.56	.038	1.16	.254	.40	3.44	3.84	20
1.88	.039	.26	.458	.61	2.92	3.53	21
1.69	.036	2.43	.435	.64	2.82	3.46	22
1.89	.035	.67	.455	.50	3.02	3.52	23
2.06	.033	.78	.457	.47	3.11	3.58	24
1.34	.076	.54	.087	.61	3.28	3.89	25
1.30	.061	5.11	.076	3.41	.17	3.58	26
.53	.070	.34	.407	1.14	2.66	3.80	27
.63	.042	2.84	.365	3.53	.15	3.68	28
.69	.068	.69	.420	.49	3.41	3.90	29
.74	.060	.74	.424	.62	3.28	3.90	30

In charging the cupola, Fig. 5, small pieces from the same pig were placed in each compartment and the ferro-manganese placed in one side only. For the second and fifth heats, shown in Table 1 two charges of pig iron with different percentages of manganese were made in the side containing the manganese. The weight of the charges were from 45 to 60 pounds of iron with a range of one to three pounds of manganese mixed with the charges. Heats Nos. 1, 2, 4, 5 and 6 were made of foundry

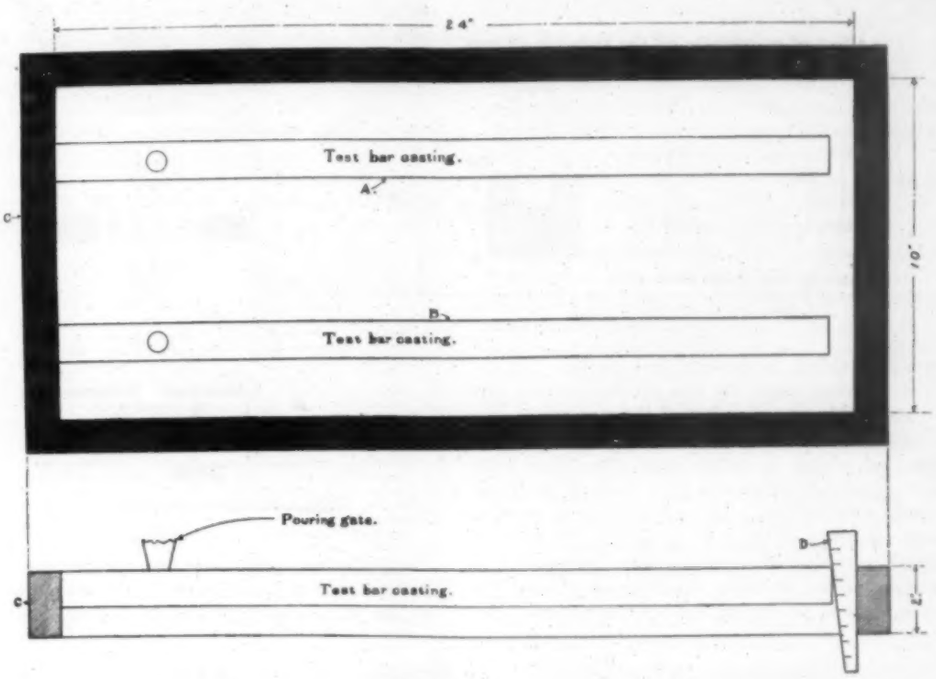


Fig. 1.

pig iron. Heats Nos. 3, 7 and 9 of charcoal pig iron, and heat No. 8 of Bessemer pig iron. The analysis of the ferro-manganese was silicon 1.65, manganese 80.34, phosphorus .354, total carbon 5.85, and no sulphur.

In adding manganese to the metal in the ladle (this metal was always that coming from the side of the cupola free from the ferro-manganese mixture), it was broken to the size of a pea and thrown gently on top of the molten metal, and then stirred well with a half inch rod until all melted and in mixture with the iron which came down as hot as is generally the case with stove plate.

The 210 analyses shown, along with the extra work of cross-checking, were made by H. E. Diller, of the Pennsylvania Malleable Co., Pittsburg. The writer and the association are greatly indebted to Mr. Diller for his work in making gratuitously such a large number of analyses. We have also in this connection to thank Prof. A. W. Smith, of the Case School of Applied Science; Mr. Frank L. Crobaugh, proprietor and expert of the Foundrymen's Laboratory, Cleveland, O., and D. K. Smith, chemist, Claire Furnace, Sharpsville, Pa., for their able services in checking the combined and graphitic carbon determinations, a work done in order to increase the confidence in the determinations of carbon. The molding casting and testing of the bars was all performed chiefly by the writer, as he believes experiments should leave as little to other parties as possible. If the labor and material involved in this series of experiments were computed at the lowest ordinary rates, the cost would reach about $300.

In a general way, the addition of manganese to the iron in the cupola increases the hardness by raising the percentage of combined carbon, which means greater contraction and chill, with a decrease in deflection and elasticity. While it is true that manganese in cupola mixtures has the tendency just mentioned, a study of the tests given in Table 1 will show that the variation of manganese generally existing in any one grade of pig iron will have very little, if any, effect on the physical properties of the casting. Something which is entirely different from the changes due to the silicon and sulphur of irons coming from any one mixture of ores, flux and fuel. A good test demonstrating this point is found in heat No. 6, which has 2.47 silicon in foundry pig when remelted. Here we find that an increase from .97 to 2.26, a difference of over 1.25 per cent. of manganese in the same pig does not cause a chill in the ends of the 1 inch square bars, when tested as at E, Fig. 4, and has only a difference of .011 in the contraction. By increasing the manganese still higher, until we have 3.71, nearly 3 per cent of an increase, we then obtain a chill of only .062 in the ends of the bars, as at E, Fig. 4, and a difference of only .021 in the contraction over that found in the test bars free of the ferro-manganese mixture. Then again, the hardness tests, column 7, show a difference of but .065 and .143 in the depth of the drilled holes, as at P, Figs 3 and 4, with the two

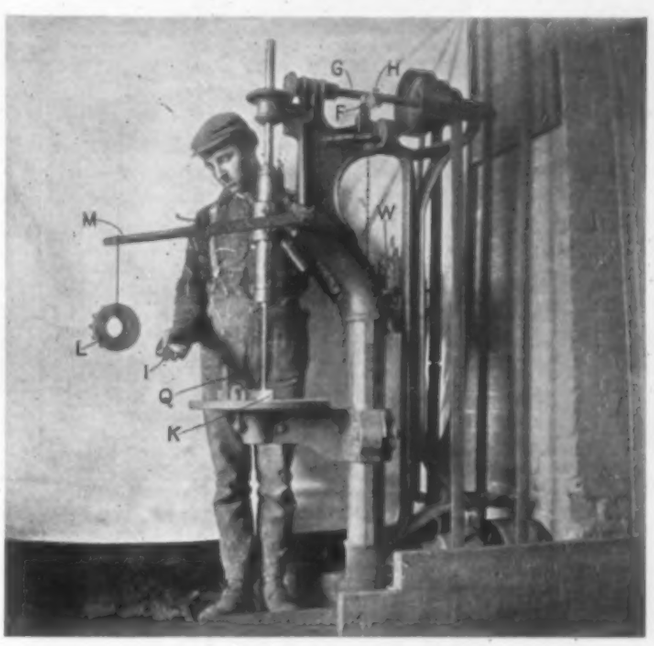


FIG. 2.

variations in manganese. Still further, the structure, column 8, of the gray body, exhibits no difference to the eye. Another point shown by this heat comes from the manganese placed on the molten metal in the ladle. Here we find that an increase of .19 in the percentage of manganese has made no difference in the contraction and a variation of but .033 in the

depth in the hardness test. This shows that the addition of manganese in the ladle tends to increase the hardness, which is contrary to what we have generally been led to believe by writers in the past. We are not confined to this one test to modify views of the past on this point, as the same result is also shown in heats No. 4, 5 and 6. However, when we get to low silicon irons, as in heats No. 7 and 9, we find that manganese in the ladle is very effective in throwing out graphitic carbon, or softening the iron, and very sensitive as it produces radical changes in these points.

In regard to the effect of manganese on the strength of cast

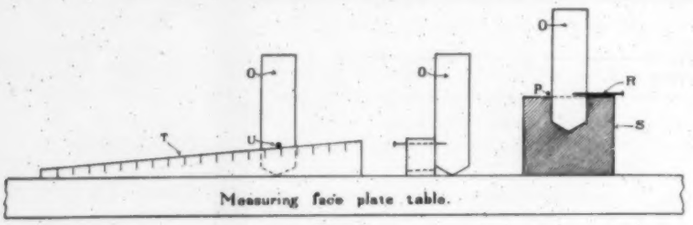


Fig. 3.

iron, its tendency, as shown, is to make iron stronger. In adding manganese to molten metal, the iron should never be dull, but as hot as practicable, in order that all the manganese may be melted in such a manner that a homogeneous mixture may result. Where iron is dull, a fracture may often show little bright spots or grains of manganese alloy that did not melt and mix properly with the iron. In such cases more harm is done than good. A study of the tests shows that the best results for strength were dependent upon certain percentages of increase. Anything above or below this was injurious. The increase of manganese in the molten metal ranged from 25 per

ing. All the bars poured with the iron having manganese added in the cupola showed its effect to a greater or less degree.

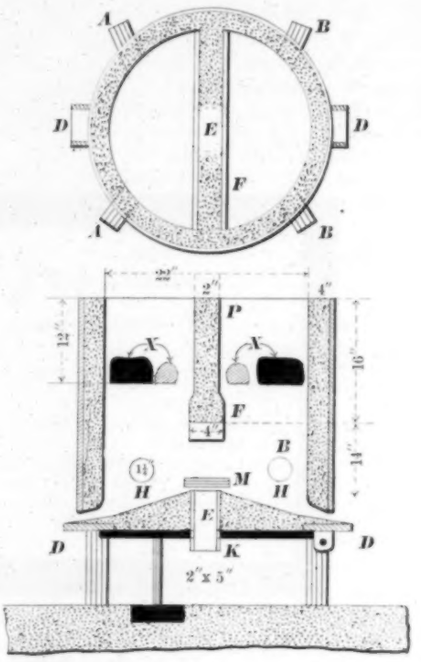


FIG. 5.

No doubt this is the cause of some castings made of the same pattern peeling much more readily than others, with the use of the same grades of sand or facing, and equal fluidity of

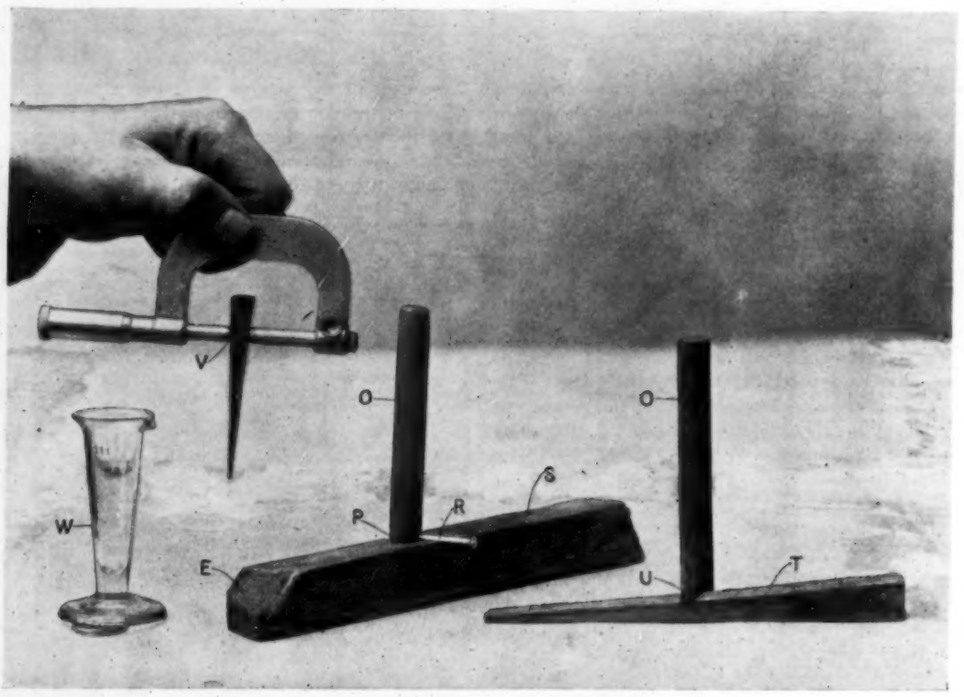


FIG. 4

cent to 60 per cent. The effect of adding manganese to molten metal on the other elements, shows an increase in the silicon and decrease in the sulphur, with phosphorus remaining fairly constant. With the manganese in the cupola, the silicon, sulphur and phosphorus are decreased. The complete table of analyses affords us excellent food for study and information on these points.

One peculiarity noticed in making these tests is seen in the high manganese of tests Nos. 2 and 6, causing the sand to peel most freely from the castings and leaving a skin covered with flakes of graphite. Whereas, with the same iron free from the ferro-manganesed mixture, the sand stuck strongly to the cast-

metal, a phenomenon we have all been often at a loss to understand.

In regard to differences noticeable in the fluidity of the metal, there was little, if any, to be seen between the iron coming from either side of the cupola, but the addition of manganese to the molten metal in the ladle increased the fluidity considerably.

When founders desire a "white iron" of the best strength obtainable in castings, heats Nos. 8 and 9 would show that it can be readily obtained by mixing ferro-manganese with good strong grades of low silicon pig or scrap iron. Of course, white iron can be obtained with the cheapest grades of old

scrap, but this will be much weaker than when good iron and ferro-manganese are used. The amount of manganese seen in heats Nos. 8 and 9 with the low silicon iron, is sufficient to make a casting having a section from three to five inches thick all white when cast without the use of chill. Where sections are heavier a greater percentage of manganese will be required.

It will appear rather odd to many to note the high silicon charcoal iron used in heat No. 3, as it is rare that such brands of iron exceed 2.00 per cent in silicon. This iron was obtained from the Jefferson Iron Co., Jefferson, Tex. The charcoal iron in heats Nos. 7 and 9 was kindly donated by the Seaman-Sleeth Co., of Pittsburg.

IRON AND STEEL STATISTICS FOR 1900.

In a recent issue the Bulletin of the American Iron and Steel Association gave the following very complete table of industrial statistics for 1899 and 1900:

Products—United States.	1899.	1900.
Shipments of Lake Superior iron ore, tons	18,251,804	19,059,201
Total production of iron ore, tons	24,693,173	
Total production of coal, tons	220,553,564	
Exports of anthracite coal, tons	1,707,796	1,692,286
Exports of bituminous coal, tons	4,644,384	6,255,023
Shipments of Connellsville coke, net tons	10,129,764	10,106,234
Total production of coke, net tons	19,668,569	
Production of pig iron, tons	13,620,703	13,789,242
Production of spiegeleisen and ferro-manganese, included above, tons	219,768	255,977
Approximate consumption of pig iron, tons	13,779,442	13,177,291
Unsold stocks of pig iron, December 31, tons	68,330	446,020
Production of Bessemer steel ingots and castings, tons	7,580,354	6,684,770
Production of Bessemer steel rails, tons	2,240,767	2,361,921
Production of open-hearth steel ingots and castings, tons	7,947,316	3,402,562
Imports of iron and steel, tons	172,774	209,066
Exports of iron and steel, tons	942,689	1,154,504
Imports of iron and steel, values	$15,900,579	$20,443,908
Exports of iron and steel, values	$105,690,047	$129,633,440
Imports of iron ore, tons	674,082	897,831
Imports of iron ore from Cuba, included above, tons	398,759	419,632
Imports of manganese ore, tons	188,349	256,252
Locomotives built by independent shops, No.	2,473	3,153
Locomotives built by Baldwin Locomotive Works, included above, No.	991	1,217
Passenger and freight cars built by independent shops, No.	123,688	134,106
Steel cars built, included above, No.	10,500	14,464
Miles of new railroad built	4,528	
Miles of completed railroad in the United States on December 31	190,833	

Products—Foreign Countries.	1899.	1900.
Production of coal in Great Britain, tons	220,064,761	225,170,163
Exports of coal from Great Britain, tons	41,180,322	44,089,197
Production of iron ore in Great Britain, tons	14,461,330	
Imports of iron ore by Great Britain, tons	7,054,579	6,597,873
Production of pig iron in Great Britain, tons	9,421,425	9,908,570
Production of Bessemer steel ingots in Great Britain, tons	1,825,074	1,745,004
Production of Bessemer steel rails in Great Britain, tons	826,148	780,844
Production of open-hearth steel ingots in Great Britain, tons	3,030,251	
Production of coal in Canada, tons	4,076,779	5,332,197
Production of pig iron in Canada, tons	94,077	86,000
Production of coal in France, metric tons	32,982,712	33,270,366
Production of iron ore in France, metric tons	4,985,702	
Production of pig iron in France, metric tons	2,578,401	2,699,494
Production of Bessemer steel ingots in France, metric tons	879,161	954,261
Production of open-hearth steel ingots in France, metric tons	619,865	688,797
Production of miscellaneous steel in France, metric tons	31,806	35,070
Production of all kinds of steel in France, metric tons	1,530,832	1,660,116
Production of coal and brown coal in Germany, metric tons	135,824,427	149,551,058
Exports of coal from Germany, metric tons	13,943,174	15,275,805
Production of iron ore in Germany and Luxemburg, metric tons	17,989,605	19,964,367
Production of pig iron in Germany and Luxemburg, metric tons	8,117,594	8,494,852
Production of Bessemer and open-hearth steel ingots in Germany, met. tons	6,180,454	6,645,989
Production of coal in Belgium, metric tons	22,072,068	
Production of iron ore in Belgium, metric tons	301,445	
Production of pig iron in Belgium, metric tons	1,034,576	1,018,807
Production of crude steel in Belgium, metric tons	731,240	694,227
Production of coal in Spain, metric tons	2,565,437	
Production of iron ore in Spain, metric tons	9,397,733	8,480,246
Production of pig iron in Spain, metric tons	295,840	298,118
Production of Bessemer and open-hearth steel ingots in Spain, metric tons	122,954	
Production of coal in Sweden, metric tons	339,344	
Production of iron ore in Sweden, metric tons	2,455,200	
Production of pig iron in Sweden, metric tons	497,727	
Production of all kinds of steel in Sweden, metric tons	273,456	
Production of iron ore in Italy, metric tons	236,549	
Production of iron ore in Algeria, metric tons	380,941	
Production of coal in India, tons	4,937,160	
Production of iron ore in India, tons	60,725	
Production of pig iron in India, tons	19,631	
Production of coal in New South Wales and other Australia, tons	6,427,128	
Production of coal in Japan in 1899, metric tons	6,701,301	
Production of pig iron in Japan in 1899, metric tons	23,052	
Production of coal in Mexico, metric tons	113,191	
Miles of completed railroad in Europe at the end of 1899	167,511	
The world's railroad mileage at the end of 1899	446,509	

The National Tube Co. has decided upon an improvement at its Youngstown, O., plant that will add greatly to the character of the works and will place it on a modern working basis. The present steam power plant used in operating the finishing department of the works will be substituted by a modern electric plant. The contract for the electric installation has already been awarded to the Westinghouse Electric & Mfg. Co. The Skinner Engine Co., of Erie, Pa., has been awarded the contract for the new steam engine to replace the present one. From time to time the same changes will be made in the other departments of the plant.

The American Metal Co., Limited, of New York, has increased its capital stock from $1,000,000 to $1,500,000.

TRADE PUBLICATIONS.

We have received General Catalog, No. 55, of the Van Dorn Iron Works Co., Cleveland, Ohio. The catalog is 4½x8½, 44 pages, giving in condensed form a description of the iron and steel productions of this company. These range from steel structures, prisons, conveying machinery, office equipments, japan ovens, to steel hangers, fences and hitching posts.

The magnitude of the business and the capacity of the firm to handle a large volume of it successfully is shown in the fact that nearly one hundred thousand steel hangers were shipped during the past year to all parts of the United States. Another item of like interest is shown in the picture of the steel work of the Williamson Building, Cleveland, Ohio. This structure contains three thousand tons of steel, fabricated and erected by the Van Dorn Co. in six months.

The catalog of the Valley Automatic Engine is a neat booklet of some twenty pages, 3⅝x5¾, devoted to an exposition of the merits of the steam engine product of the Valley Iron Works, Williamsport, Pa. This engine is made in all sizes from 5x7 to 16x24 with an estimated maximum range of fourteen horse-power in the smaller to two hundred and fifty-eight horse-power in the largest size. The bed is of "Tangye" type with overhanging cylinder. The piston is of solid locomotive pattern of ample length. The valve is square and set in the valve seat in a wedge position; over the valve is placed a cover having suitable grooves to correspond with the port openings on the opposite face; between the balance cover and the cover seat are placed strips of copper one-hundredth of an inch in thickness, which give an opportunity for adjustment at this point to compensate for wear of valve.

A four-page circular is being circulated by the Jeffrey Manufacturing Co., Columbus, Ohio, illustrating elevating and conveying machinery for mills, factories, mines, industrial and power plants. The circular is crowded with half-tones suggesting the variety of the machinery manufactured by the Jeffrey M'f'g Co., and calls attention to the need of sending for their general catalog in order to gain an adequate idea of their product.

The stock list gotten out by A. M. Castle & Co., Chicago, for July, is 4½x6¾ with 48 pages, giving sizes and quantities of railway and boiler makers' iron and steel supplies, comprising Lukens plates, Reading tubes, Champion rivets, hydraulic riveters, flanging presses, steam and drop hammers, engine and motor driven plate, bending rolls, Cone depressed corrugated locomotive fire-boxes. Several useful tables and specification data of rivets and fire-boxes, adopted respectively by the American Boiler Manufacturers' Association, the leading railroads and the locomotive works are incorporated in the catalog.

We have received some of the more recently printed matter of the New Britain Machine Co., New Britain, Conn., dealing with tool racks, lathe pans, shelving and other machine shop furniture; mortisers and mortising as well as the Case automatic high-speed engine. The catalogs describing the mortising machinery and the Case engine are each standard size, 6x9; the others are 3½x6½ circulars.

The special advantages of the Chain Saw Mortiser are clearly set forth at length, also its general construction and work, methods of use and the opinions of various users, with many cuts of the mortising machinery, etc.

The Case engine is built automatic or throttling, double and reversible; is also arranged for attachment to an overhead beam when so desired.

Regulation is close enough for direct connection to dynamos and the engines are built on the interchangeable plan to standard gauges and templates and a stock of parts of all sizes of engines is kept constantly on hand for prompt delivery.

The line of machine-shop furniture, of blacksmiths' and machinists' pans and racks, is all iron, portable or stationery as desired. A lathe rack, two-story high, with drawer and lock; an oil or soda-water feeder that will not jar out of adjustment, both feeder, and rack are capable of fitting any lathe; these are features of modern practice and convenience far ahead of the oldtime makeshift struggles to attain the same ends with devices rigged at random from scrap.

The National Galvanizing Co., Chicago, has been incorporated with a stock of $12,000. The incorporators are Henry Koester, Frederick C. Brightly and Spencer Ward.

MELTING BRASS.*

BY C. VICKERS, CHICAGO.

Brass, bronze, and other copper aloys are seldom melted in contact with the fuel, as in the case of iron. Crucibles are universally used, the furnaces are simple in construction, and so well known as to need no description. Solid fuel is most generally made use of, either hard coal, or coke, coal being the best for furnaces with forced draught. Liquid and gaseous fuels are also used in melting, but will never entirely supplant the old straight shaft furnaces. This is not because brass founders are conservative as a class, and object to change, but rather that their foundries are generally small affairs, and located in all sorts of out of the way places, such as the upper floors of high buildings, and places possessing no railroad facilities. Under such conditions oil cannot be obtained at a price that will allow it to compete with coal or coke. The use of oil also in crowded cities increases fire risks. Gas may be easily obtained, but its application to brass melting requires the attention of specially skilled workmen in order to be efficient and economical. Gas, however, is an ideal fuel; it is clean, easily regulated and applied, and leaves no ashes to carry away metal, but such is the ignorance and prejudice of the average melter, that manufacturers of gas furnaces, convinced that their furnaces will never get fair treatment at the hands of these men have retired from the field in disgust, and no longer seek to place their products in the average brass foundry.

Whatever kind of furnace may be used, the melting and handling of copper alloys requires the most careful supervision on the part of the management, or the loss of metal will be so great that it plays havoc with the profits of the business. This loss is greater in summer than in winter, as the great heat to which the men are exposed, saps their vitality and makes it impossible for them to stand up to their work as well as in cold weather. More metal is therefore spilled in the furnaces, and lost by oxidation. The ashes and skimmings should receive careful attention, and the recovered metal be promptly used up. The cost of melting may be greatly increased by the injudicious handling of crucibles.

As the subject of crucibles has been exhaustively and ably dealt with in a former paper read before this association, the present writer will content himself with a few remarks on tongs, as ill-fitting tongs bring many crucibles to an untimely end. Some brass foundries habitually use tongs with only one set of straps; tongs such as this are very liable to crush the pot, especially when used for pouring. They grip the pot a little below the bilge when the lip of the pot is rested on the edge of the mold and the tongs pulled over to lip it in pouring, if the tongs do not grip with great force the leverage will cause them to slip, and this is fatal to the successful running of light work. The pressure of the tongs being great enough to hold the pot firmly, it is soon squeezed out of shape and becomes oval. This continues until a crack is developed and the further usefulness of the pot is ended. Tongs with two sets of straps are the best, one set gripping below and the other slightly above the bilge. They are very liable to warp out of shape, however, and should be fitted from time to time to a new pot. Tongs with ace of spade shaped points, the ace gripping below the bilge and the straps around the same ought not to be used in "pulling out," as the fuel will often prevent their going to place, and the points of the ace grip the pot where they are not intended to fit and they sink into and pierce the softened pot.

To obviate these troubles furnaces have been devised, from which the crucible is never removed. The metal being poured out by tipping the furnace. This is all right on heavy work, but is useless on work where the metal must be used "jumping hot," as the transference to a pouring vessel will inevitably cool it. For exceedingly light work experience has taught that small crucibles and tong pouring are the best.

It is a good idea to have two spouts to a crucible, one at right angles to the other. This second spout can be easily made with a file, before the pot is used. Then if both spouts are used alternately in pouring, the pot will retain its circular form and not be so liable to crush.

Crucibles are often broken when melting ingot copper and heavy pieces of brass, by carelessness in packing the same when the pot is charged. Each ingot should rest on the bottom of the pot and not be suspended by other ingots on the sides of the pot, otherwise when melting commences these suspended ingots are liable to act as a wedge, and in sinking burst the softened crucible.

When brass is melted with ingot copper it is often good practice to melt the brass first, placing the copper ingots on top of the pot and when hot dropping them into the melted brass. This will cut them away, bringing the heat out quicker.

Sometimes crucibles will fail from no fault discoverable in the furnacemen's method of handling them. They have been known to leak one after the other, about the third or fourth heat, when they should have lasted at least twenty. In the writer's experience, such leakage has often come from minute holes which developed, out of which the metal oozed in drops. Brass founders have contended that this arose from some defect in the material of which the crucibles were made. While this is not admitted by the makers they allow that many crucibles, made in the year 1899, were not up to standard and gave a very plausible explanation thereof.

"Owing to the exhaustion of the reserve stock of plumbago, due to the enormous demand which arose on the revival of business in that year, everything that would pass as plumbago was sold to the crucible makers, and therefore the defects noticed may have occurred from the use of imperfect material when the better grade could not be obtained."

Early in 1900, however, things changed for the better, good material became again obtainable and makers report for that and this year so far, "unprecedented runs of a goodly number of heats."

*Read at the Buffalo Meeting (May, 1901) of the American Foundrymen's Association.

The Wright Steam Specialties.

The Wright Mfg. Co. of Detroit, Mich., has introduced some interesting innovations in their line of steam specialties. Their safety water column has but one float and a single valve; the float being spherical and seamless and the valve is placed in a vertical position at the top of the water column. All the working parts are attached to the cap and access can readily be obtained should repairs be necessary. Extra heavy construction is adopted in order to fully meet the requirements of modern high-pressure steam practice. A safety water column not only protects life and property, but acts as a constant spur to the greater efficiency of the boiler attendants, watchfulness must be maintained by reason of the fact that that is the only way in which the warning whistle can be kept silent; and a constant water level, fewer repairs and increased economy is thus assured.

An emergency steam trap is also made by the same company and is illustrated herewith. Three outlet valves are employed, placed at the top of the trap away from dirt or sediment. The water forms a seal of four to six inches over the lower end of the outlet pipe, preventing the waste of steam. The outlet valves are arranged to open consecutively by the pins in the float stem acting successively upon the levers, as shown in the small sectional elevation to the right of the illustration. Ordinarily the one valve is sufficient but in case of emergency the action of the trap is instantaneous.

The traps are provided with a by-pass and provision is made for the application of a water gauge by which the action of the trap may be watched. The floats are tested to 300 pounds hydrostatic, and are guaranteed for a working pressure of 150 pounds per square inch.

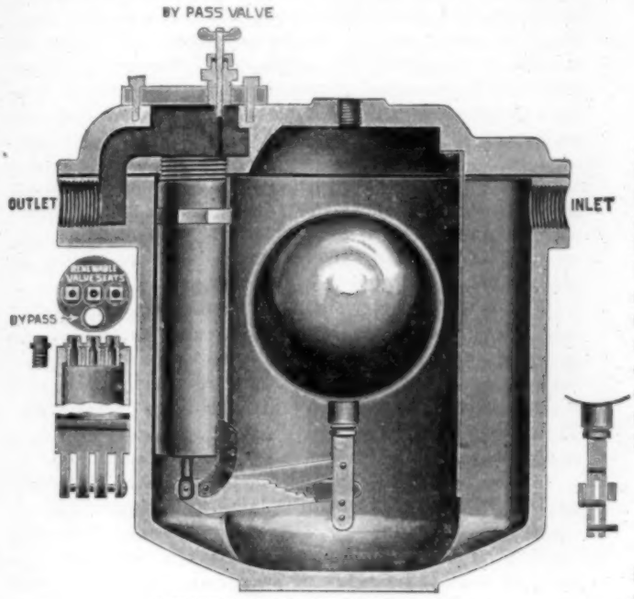
The Lidgerwood-Miller Marine Cableway.

A model of the Lidgerwood-Miller Marine Cableway, 35 feet long, is on exhibition at the Pan-American Exposition in the Ordnance Building, and illustrates in a very realistic manner the method by which vessels can be coaled at sea. The model shows the operating winches on the warship just as they will be installed on the battleship "Illinois," for which the Lidgerwood Mfg. Co. has recently been awarded contract. The cableway is shown in operation and the model is so contrived that an electric motor causes the collier to pitch, thus demonstrating the method of operating the cableway in spite of the relative motion of the ships.

REORGANIZATION OF THE NATIONAL STEEL CO. AND THE AMERICAN STEEL HOOP CO.

At meetings of the boards of directors of the National Steel Co. and the American Steel Hoop Co. held in New York Wednesday, July 3, a reorganization of the executive personnel of the two companies was effected by the election of the following officers for both companies: W. E. Corey, president; H. P. Bope, first vice president; W. W. Blackburn, second vice president; W. W. Blackburn, secretary; W. C McCausland, treasurer; James J. Campbell, assistant secretary and auditor; William R. Conrad, assistant treasurer; Henry P. Bope, general manager of sales; John E. Woods, assistant general manager of sales; J. P. Kessler, Jr., General agent; James B. McKillips, assistant auditor; F. B. Thompson assistant auditor; J. H. Blackburn, auditor of receipts; F. A. McCune, cashier; John McLeod, assistant to president; H. J. Lindsey, assistant to first vice president; Ambrose Monell, engineer of tests; D. G. Kerr, ore supply agent; George E. McCauge, traffic manager; L. C. Bihler, assistant traffic manager; H. A. Fennerty, purchasing agent; H. P. Howell, credit manager; Charles E. McKillips, special agent.

The new officers of the two companies are all officials of the Carnegie Steel Co. and the reorganization amounts practically to the absorption of the two companies by the Carnegie



WRIGHT EMERGENCY STEAM TRAP.

Steel Co. The general offices of the two companies have been transferred from New York to Pittsburg and the business will be continued with headquarters in the Carnegie Building without change of name of either of the two companies.

A special train carrying the clerks of the two companies to the number of 115 arrived from New York in Pittsburg on Saturday morning. Five of the clerks have been located in the treasurer's department; 11 in the sales department; 15 in the shipping department and the remainder in the accounting department. Owing to the quarters of the latter department in the Carnegie Building not being large enough about 30 of the clerks have been located in the Empire building.

No changes have been made in the operating departments of the two companies other than those previously announced which became effective July 1.

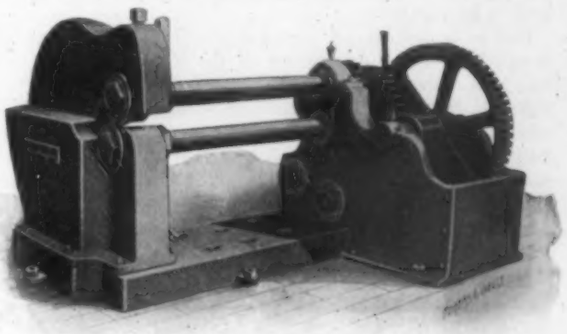
President Schwab of the United States Steel Corporation, has just put into effect a most comprehensive system for securing harmony and economy in the operation of the various underlying companies.

The general managers of each of the principal departments of the different steel companies have been formed into committees, with a selected chairman, and these committees meet regularly in New York to discuss questions relating to that particular department.

H. P. Bope, first vice president and general manager of sales of the Carnegie Company, has been made chairman of the committee of general sales managers. George E. McCague, general freight agent of the Carnegie Co., has been made chairman of the freight agents' committee of the underlying companies, and J. J. Campbell, assistant secretary and auditor of the Carnegie Co., has been made chairman of the committee of auditors.

LENNOX ROTARY SPLITTING SHEAR.

In a recent issue a brief description was given of the Lennox rotary bevel shear for use in boiler shops and other plate working shops. Below is shown a sister machine, the Lennox rotary



LENNOX ROTARY SPLITTING SHEAR

splitting shear, also manufactured by the Lennox Machine Co. of Marshalltown, Ia. The splitting shear is designed for both straight and circle shearing of plate from ⅛ to ¾ inches in thickness, as well as for cutting rounds, squares, angles, bars, etc. It is made in three sizes with 4, 6, and 8-ft. throat. Its rotary continuous motion admits of more accurate work and a cleaner edge than is possible with shears that work on the knife principle. The relation of the knives to the throat is such that a 16-ft sheet can be spit through the middle. This construction gives the Lennox splitting shear several times the capacity in proportion to its weight that is given by the old throat pattern. This machine is sold by Jos. T. Ryerson & Son, of Chicago.

A Cog-Wheel Caprice.

A press despatch from York, Pa., states that:

"Paul R. Bocksch, a sixteen-year-old boy of this city, has invented a device which many expert engineers declare will revolutionize the business of steam railroading.

"Bocksch's invention consists of three geared wheels, connected with three small cogs, which are fastened to the axles of the large drivers of a locomotive. The small cog wheels, it is declared, will revolve three times as fast as would the large drivers with the same expenditure of power.

"This invention has been patented, and the young inventor has refused an offer of $30,000 for his rights."

The scheme is novel in all probability and does credit to the imaginative individual who wrote the account; with a little better knowledge of the subject, the account might not have been written. Perhaps the word "geared" is to be read as "weird," but even so the production is not in the category with the celebrated lathe described by Chordal as "a few gears and a hole in the ground."

Until further information is at hand, the refusal of that $30,000 seems premature.

A suit for damages in the sum of $25,000 was begun last week in the common pleas court at Dayton, O., by the Dayton Mfg. Co. of that place, against the Metal Polishers' Local Union. The suit is considered a highly important one and the decision of the court will be watched with interest both by labor organizations and manufacturers. The purpose of the suit is to establish if possible, the individual liability of a member of the organization for damages resulting from acts which are calculated to interfere with the business of the concern upon which a strike has been declared pursuant to instructions of the union.

PERSONAL.

Robert Geddis, assistant sales agent of Jones & Laughlins, Ltd., sailed for England last Saturday. He will spend two months abroad visiting the foreign trade of the company.

Daniel Tolton, formerly employed by William Tod & Co., at Youngstown, O., has been appointed chief of engines at the Ohio plant of the National Steel Co., at Youngstown, O.

By the will of the late Jacob S. Rogers, of Paterson, N. J., the Metropolitan Museum of Art of New York, will receive an enormous endowment fund estimated at from $5,000,000 to $7,000,000.

Herbert Dupuy of the Crucible Steel Co. of America, and residing at Pittsburg, Pa., has purchased a 91-acre tract of coal land at $375 an acre.

George L. Gelwig, of Youngstown, O., has been appointed head of the order department of the Republic Iron & Steel Co., with offices at Chicago.

Frank B. Ward, who has had charge of the Cleveland office of Manning, Maxwell & Moore, resigned his position July 1, to take control as manager of the Pittsburg & Cleveland branches of the Niles-Bement-Pond Co., with headquarters at Carnegie Building, Pittsburg. Mr. Ward was formerly connected with the Carnegie Steel Co. at the Edgar Thomson Steel Works for five years from 1881 to 1886.

John Machin, superintendent of the Struthers furnace at Struthers, O., has resigned to accept the superintendency of the Hannah furnace of the Republic Iron & Steel Co. Mr. Machin succeeds John Fise at the Hannah stack. John McMahon will succeed Mr. Machin at the Struthers furnace.

Lewis S. and George M. Gillette will sever all official relations with the Gillette-Herzog plant of the American Bridge Co. at Minneapolis, Minn., on August 1. The two brothers will resign to look after their vast private interests which demand their undivided attention.

Obituary.

Dr. George Hay, one of the best known metallurgical chemists in Western Pennsylvania, and who was connected for many years with the Carnegie Steel Co., died at his home in Pittsburg, Pa., on Wednesday evening, July 3. Dr. Hay was a native of Edinburgh, Scotland, and came to Pittsburg about thirty years ago. He received his early education in Edinburgh and for some years taught a school in his native city. After leaving his occupation as a teacher he enlisted in the English navy and rose until he became a navigator in the Mediterranean fleet. Upon retiring from the navy he came to the United States and located in Pittsburg. Shortly after he went to Philadelphia, where he attended the medical school of the University of Pennsylvania, of which he was a graduate. Dr. Hay was the author of several technical works, the best known of which is one on cremation. He also lectured extensively on disease. He wrote a number of treatises on on hydrophobia. Dr. Hay never practiced medicine extensively, giving almost his entire attention to chemistry. Six brothers, two of whom, James and Hugh Hay, of Allegheny, survive him. Dr. Hay was never married.

Frank J. Patterson, vice-president of the National Cash Register Co., Dayton, O., died suddenly of heart failure at his home in that city, July 4. Mr. Patterson, in conjunction with his brother, John H. Patterson, had built up one of the most successful business enterprises from a very modest foundation and the flattering results are enhanced by the fact that in this era of industrial betterment the great factory at Dayton is a conspicuous exemplar of the best methods in that direction as in others.

Mr. Patterson was born 52 years ago, a few miles south of Dayton, and became interested in the N. C. R. in 1882; with his brother purchased the plant which was then capitalized at $10,000; a capitalization that has been increased to $5,000,000.

The sheet plant of the Allegheny Iron & Steel Works at Avenue, Pa., on the West Penn railroad, commenced operations this week. Four of the eight mills were placed in operation and the remaining four will be placed in operation in about a week. The open-hearth furnaces are nearing completion and will be lighted in about ten days.

THE DEMAND FOR SKILL IN BOILER SHOPS.

Foundrymen will bear testimony to the difficulty of finding on call foremen who meet their ideas of what the supervisor of operations in the foundry should have as equipment for his work. It may be that the ideas of foundry proprietors as to the remuneration of foremen are not sufficiently liberal to stimulate any great competition for such places. That is a matter over which there has been not a little discussion. The fact remains that there is no surplus of foreman talent in the foundry world. Boiler works have a similar experience, as is indicated by the article reprinted below from the *Boiler Maker*. Possibly the suggestions of the article may be applicable to the foundry and machine shop as well:

"Hardly a day passes but we are asked to find foremen, either for new boiler shops or for the enlarged ones. Our advertising columns further confirm this unsatisfied demand. It is therefore plain the good men are employed, and new ones are lacking for the natural increased demand. In consideration of what we have to say, it may be well to ask first, what are the requirements of a foreman in a modern boiler shop? and second, how are these requirements to be met?

"First: The modern foreman of a boiler shop should be thoroughly skilled in steam engineering, both through study and experience. This involves a knowledge of mechanical drawings and the ability to make them. He should have access to, and an inclination to read, technical journals. Costs should be known to him, that he may apply the lessons this valuable knowledge affords. And, most important, he should have an understanding and control of men, so as to secure from them the greatest of service. There are some such, but self-taught largely. Long years have been taken, when, with proper study, months would have sufficed. This type of man is found in the shops of engine builders, large foundries, bridge and machine shops and kindred industries, and he is needed in every large boiler shop to secure the largest output with the greatest economies, with a constant improvement of the product.

"Second: If it will be admitted that better men are needed, the problem of getting them is to be faced. The trades union discourages any effort at individual advancement, so it is higher wages, rather than better or more work, that the rivet boy has for his ambition, ending in admission to the 'lodge.' These boys must be given every chance to improve themselves, or else the best of them will seek some other occupations.

"In about every boiler shop a room or corner could be fixed up where trade papers could be placed, a few drawing boards could be set up, and, at very slight expense, lessons in mechanical drawing, laying-out, etc., could be taught, which the lads, and even some of the older men, would gladly pay for, in part. Their noon hour could be given to reading, and their evenings to study. This awakening of their faculties, and arousing of their ambitions, would be followed by a spirit of better service that can hardly be estimated. It is this sort of interest that will secure to every employer the most devoted and desirable labor, and give him a larger return on the investment than any labor-saving tool can offer. And again, there is the satisfaction of having done a good thing for a fellow less fortunate than ourselves."

Chemical Analysis the Proper Basis for Pig Iron Sales.

To the Editor:

Replying to Mr. Vannier's remarks on the subject of grading pig iron which appeared in your issue of June 27, I would say that in my opinion the only proper manner of selling and determining quality and character is by full analysis, irrespective of grade, fracture or number. The analysis will give the true character of the iron and its adaptability for different requirements. Making and handling pig iron by old methods must give way to modern scientific principles. No doubt chemical determinations will be Greek to many users of pig iron, but if they desire to remain in the procession they will have to adapt themselves to conditions or continue in the background.

James V. Umberger, Sales Agent,
Bethlehem Steel Co.,
Pig Iron Department.

TEST OF COSGRAVE PLATE.

The formal test of an armor plate made by the process invented by S. A. Cosgrave of Pittsburg, Pa., was made at the United States proving grounds at Indian Head on Tuesday, July 2. The test, according to the inventor of the process, was highly successful, although the Navy Bureau Ordnance officials are skeptical of the results obtained.

In addition to the officers of the Ordnance Bureau there were present at the test S. A. Cosgrave, Aaron French, P. N. French, J. M. Anderson and J. W. Patterson, all of Pittsburg. The plate tested was rolled at the plant of the Carbon Steel Co. at Pittsburg, Pa., from an ingot weighing 26,000 pounds and was seven feet long, five feet wide and had a uniform thickness of two inches of very highly carbonized steel and with a four-inch back of soft steel. Regarding the test Mr. Cosgrave spoke as follows:

"The plate was set at a distance of 320 feet from a six-inch gun, and four shots were fired with a projectile weighing 100 pounds. The velocity of the projectile was 2,011 feet per second for the first shot, 2,019 feet for the second, 2,011 feet for the third and 1,490 feet for the fourth. The regular test is 1,900 feet per second. The plate was penetrated, as can be done in the case of every plate tested by a six-inch gun, but no shot either cracked or broke the plate, yet the projectiles fired at a velocity of 2,011 feet and 2,019 feet to the second were broken to pieces, the plates being perfectly intact, except for the perforation. In the case of the fourth shot at the low velocity of 1,490 feet per second, the intention of the ordnance expert was to have the projectile stick in the plate, if possible, to see if the vibration, which follows in such an event, would crack the plate, but while it penetrated and stuck in the plate no cracks were apparent.

"The test was a most successful one in the opinion of the experts present, as it demonstrated that the theory of the Cosgrave process is correct. The difference between the Krupp process, Harveyized, and the Cosgrave process is that the former can only be tempered and hardened to a depth not exceeding at most one and a half inches, and never uniformly over the surface of the plate. The Cosgrave plate can be made of any thickness of absolutely uniform hardness.

"It is also stated in the report from Washington that it is an impossible task to manufacture plates by this process, but the fact remains that it has been done both at the works of Howe, Brown & Co., and at the Carbon Steel Co."

Another plate will soon be rolled 10 inches thick. The face of the plate to a depth of four inches will be highly carbonized while the soft backing will be 6 inches in thickness. In addition the per cent of carbon in the face of the new plate will be increased in order to increase its resisting qualities.

Properties of the Colorado Fuel & Iron Co.

The application of the Colorado Fuel & Iron Co. for the listing of $6,000,000 additional stock as well as additional bonds on the New York stock exchange contained the following description of the properties owned and controlled by the company:

Real Estate—Coal lands owned, 253,326 acres; coal lands leased, 22,058 acres; total, 275,384 acres. Iron lands owned, 1,459 acres; iron lands leased, 1,466 acres; total, 2,925 acres. Iron and steel plant, water supply reservoirs, limestone quarries, etc., 3,468 acres; agricultural, grazing and timber lands, 165,085 acres; grand total, 446,862 acres. Town lots, Pueblo, Walsenburg, Crested Butte and Sopris, 2,500 acres. Fuel Department—Twenty-four coal mines in operation, daily capacity, 20,000 tons; 1,282 coke ovens in operation, daily capacity 2,300 tons; 900 coke ovens under construction, daily capacity, 1,500 tons; total, 2,182 ovens and 3,800 tons. Iron Department, three iron mines in operation, capacity, 3,000 tons per day. Limestone quarry, capacity 2,000 tons per day. Iron and steel plant near Pueblo, Col., Two blast furnaces in operation, capacity, 450 tons per day; 3 blast furnaces under construction, capacity, 1,200 tons per day; total 5 furnaces, capacity, 1,650 tons; Bessemer converter, capacity, 2,000 tons per day; 1 blooming mill, capacity, 2,000 per day; 1 blooming mill under construction, capacity, 2,000 per day; 10 basic open-hearth steel converters under construction, capacity, 1,000 per day; rail mill, capacity, 2,000 per day; merchant mills, capacity, 200 per day; pipe foundry, capacity, 40 per day; bolt and spike mills, castings foundry, machine shop, roll shop, electric plant, water works, etc. Auxiliary plants in course of construction—Merchant, tin plate and bar mill, capacity, 400 tons per day; cotton tie, hoop and merchant mill, capacity, 150 per day; rod mill, wire and nail plants, capacity, 600 per day; tin plate mill, capacity, 200 per day; sheet mills capacity, 150 per day; plate mill, capacity, 300 per day; total, 1,800 per day.

The capacities of the Bessemer converter and rail mills are given as they will be when improvements now under way are completed. The company leases and operates a rolling mill plant at Laramie, Wyo., capacity, 100 tons per day.

NON-INTERRUPTION FEATURE OF THE WAGE SCALE.

The non-interruptive clause incorporated in the 1901-1902 scale of the Amalgamated Association the acceptance of which by the Republic Iron & Steel Co. and the American Tin Plate Co. is announced, contingent upon its acceptance by the American Sheet Steel Co. and the American Steel Hoop Co. does not prevent the shutting down of the mills of these companies during the summer months, in case of a disagreement over the provisions of the scale as presented to the manufacturers. No provision is made for the operation of the mills after July 1 in case no settlement has been reached before that date. The clause as incorporated in the scale will lengthen the conference period a month over the present and it is not at all improbable that this additional time will be consumed in the discussion of the scale, thus greatly lengthening the period of uncertainty which the manufacturers so much fear every year.

The clause provides that the scale must be presented to the manufacturers on or before May 1, and the scale year ends on June 14, instead of July 1. The period for the adjustment of the scale extends from May 1 to June 15 and if no settlement is reached a third party is to be called in to be known as a "conciliator," for the purpose of bringing the two sides together. If no settlement is reached before July 1, the mills are to be closed until the scale is adjusted. The conciliator, or arbitrator, according to the provisions of the clause is not vested with authority sufficiently great to force a settlement by concessions on both sides, and in this respect as well as in lengthening the period for adjusting the scale the clause is considered weak by the manufacturers. Settlements of scales in the past have proved only too conclusively that they are rarely if ever signed except upon the eve of the expiration of the scale in force.

This clause only becomes effective when all the combinations over whose plants the Amalgamated Association has jurisdiction accept it. Thus far it has been accepted by the Republic Iron & Steel Co. and the American Tin Plate Co., and the officials of the American Steel Hoop Co. and the American Sheet Steel Co. stand ready to accept the clause when permitted to sign for their union mills. It is believed, however, that special arrangements will be made to carry out the provisions of the clause for the benefit of the Republic Iron & Steel Co. and the American Tin Plate Co. even if no agreement should be reached with the two combinations at whose union plants a strike now exists.

The Enterprise Boiler Co. of Youngstown, O., has been awarded a contract for 20 30-ton hot metal cars by the Lackawanna Iron & Steel Co. for shipment to the new plant which is under construction at Stony Point, near Buffalo, N. Y. In addition to this order contracts have been recently closed by the company for 20 30-ton ladle cars for the Illinois Steel Co. and six 20-ton cars for the Colorado Fuel & Iron Co. of Denver, Col.

During the past week the Stilwell-Bierce & Smith-Vaile Co., of Dayton, O., shipped feed-water heaters to the J. J. Snider Lumber Co., Columbus, O.; Briggs Machinery & Supply Co., Dallas, Texas; Wm. Focke's Sons, Dayton, O.; The Warren Electric & Specialty Co., Warren, O., and the Pittsburg Coal Co., Manown, Ia.

TORPENAS-STEEL OIL CUPS.

The Sargent Company, Old Colony Building, Chicago, is sending out a circular relative to the Tropenas-steel oil cup it has lately introduced to the notice of the machinist. The material from which these cups are made is extremely ductile and is at the same time of a high degree of strength and soundness. The half-tone tells no uncertain story of the quality and toughness of the metal when subjected to severe pressures. A A are the finished cups; at B B the photograph shows the cups after the walls have been pressed together in the vise. A longitudinal pressure has been exerted to flatten out the cups at C C and the walls of another cup have been folded inwards as shown at D.

These are rigorous tests and they demonstrate, in the absence of any noticeable fracture, the high-grade characteristics of the material employed.

Where lightness and strength are most desirable qualities, as in fast-running mechanism of all kinds, these cups will be found of considerable usefulness, while their price, which is but two-thirds that of brass oil cups, should give a decided impetus to their application to machinery in general. This tendency is already felt by the Sargent Company, which is erecting an extensive addition to its Tropenas Department in order to fill the demand for these oil cups and other similar castings of toughened steel.

THE IMPROVEMENT OF CAST IRON WHEELS.

BY S. P. BUSH.

The possible deficiency of the cast iron wheel which has been suggested in the columns of the *Railroad Gazette* is a matter of more than ordinary interest both to the railroads and wheel makers. From what has been said, it appears as if the difficulty lies in the breakage of flanges, and as it has been observed more frequently in the case of 50-ton cars, it would not be unnatural to conclude that the service is too severe.

The cast iron wheel is in many respects ideal in its make up. It has a very hard, durable tread, a tough body or center, is composed of but a single piece, is cheap, and can be made in many parts of the country. It has rendered such valuable service, and has been the source of such great economy that it would seem that if some assistance could be rendered it, or if some further development could be made upon it, it would certainly be to the advantage of the railroads to do so. It has been thoroughly demonstrated up to the present time at least that any other kind of wheel service would increase the cost from four to five times, but, even if it were but double, it would be enough to warrant a much greater outlay in the cast iron wheel than is the usual practice.

Assuming that the principal difficulty lies in the breakage of flanges, it appears to the writer that there may be a remedy in the direction of relieving the flange of some of the work that it has sometimes to perform. In designing the 80,000 and 100,000 lbs. capacity M. C. B. axles, an allowance of 40 per cent was made in the strength in order to resist the lateral thrust which is transmitted through the wheel flange to the axle. It may be assumed that this thrust may be taken somewhat as a blow rather than as a pressure covering a time interval, which assumption is undoubtedly fair under the conditions brought about by the use of a rigid truck. It may be that, even with a rigid truck, the lateral force does not reach quite the intensity of a blow, but it is safe to say that it must more nearly approach such than is the case with trucks permitting lateral motion, and more of a time interval through which to receive the force. This is readily demonstrated. Surely we could not use passenger cars today with rigid trucks. They would not be tolerated. Is it right, therefore, to expect the flange of a cast iron wheel to perform such work when it is known that it can easily be knocked off with a small sledge in the hands of the ordinary man? The stiffening of the axle and the more rigid construction of the 100,000 lbs. capacity steel car have but added to the already difficult work of the flange.

Certainly it seems that much may be accomplished by so constructing cars that the lateral forces which the flange is called upon to receive will be cushioned more or less. This would not only prove a benefit to the wheel but to the axle, and the whole structure of the car, to say nothing of the track.

It is believed by the writer that the life of the flange and wheel could be materially improved by abandoning the present custom. The standard contour of the country is conical tread. What takes place when a new wheel carrying 17,000 lbs. rests on the top of a rail head is clear. Theoretically, the bearing is a point, but as a matter of fact the wheel is forced into the rail to the detriment of the latter, and the rapid wear of the former over that portion of the tread which comes in contact with rail, until the tread is worn to a natural contour nearly flat or cylindrical for approximately 1¼ inch of the width.

It frequently happens, however, that this cylindrical portion commences very close to the flange as a result of some influence constantly forcing the flange against the rail, which might be easily avoided, however, by having the contour differently shaped at the start. The contour would then protect the flange in a most admirable manner, inasmuch as that portion of the tread between the cylindrical portion and the flange presents a rapidly increasing diameter of wheel which will check any tendency toward flange wear or pressure. This contour is in effect the "Barr" contour, and the writer can state from experience that it is thoroughly satisfactory. It certainly appeals to the judgment as logical and practical.

We know beyond question that any contour must come approximately to this after a very short service, and there seems to be no good reason why wheels should not have this to begin with and thus avoid many of the cases of early flange wear. Once a wheel is worn at the flange the possibility of failure is very much increased inasmuch as the pressure against the flange, intead of being at the root, where it is best able to resist, is farther away from the tread, and consequently increases the movement or leverage operating to force the flange off.

It is unnecessary to say that the quality of cast iron wheel must be the best, but aside from this it can be hardly doubted that there is an opportunity to help the cast iron wheel perform satisfactorily the greater work that has of late been imposed upon it.—[Railroad Gazette.

TROPENAS-STEEL OIL CUPS.

On July 15 the American Tin Plate Co. will commence operations at its Laughlin plant at Martin's Ferry, near Wheeling, W. Va. The mill contains 32 hot mills and finishing capacity in proportion. The plant is new and up to date in every particular.

SPECIFICATIONS FOR STEEL RAILS.*

BY STEPHEN W. BALDWIN, NEW YORK.

The specifications proposed by the American Committee, and appended to Mr. Webster's paper, are intended to establish standards of quality and methods of ascertaining quality which, while fair to both parties, will secure in each case, under the present conditions of practice, satisfactory rails. Without discussing them in this aspect of immediate usefulness, I wish to offer some suggestions, looking rather to future improvement in the manufacture. In other words, it seems to me that specifications based upon the existing state of the art might well include, or be accompanied in application by, provisions for the collection of such information, beyong the immediate question commercially involved, as would promote further technical progress. The inspection of rails under such specifications furnishes all the means of collecting such information on a large scale, and with scientific accuracy. It would be a pity not to utilize it to its full capacity. We may safely assume that both the maker and the user of rails are desirous of improving the process and its product; and that they are willing to co-operate to this end, by recording all facts bearing upon it. Such co-operation requires that each party shall furnish to the other the facts known to him, so that a complete and trustworthy history of a representative portion of each lot of rails shall be accessible to both.

As will be seen, the suggestion I here offer relates more particularly to the information which could be, ought to be, and generally is not, furnished to the maker by the user. When a lot of rails has once been inspected and accepted, the manufacturer hears nothing more of them, unless he has given a guaranty of a certain number of years' wear, in which case he may have to pay the penalty of failure, without being able to trace its causes.

To make up this deficiency, I would propose:

1. That the railroad company require from its inspector of

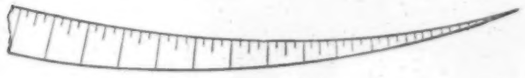


FIG. 1.

rails a report as to the ore used, the chemical composition of the steel, the results of physical tests, the method of manufacture (including the use of the direct or the indirect process, upright or horizontal furnaces, direct rolling from the ingot or re-heated blooms, the size of ingots and blooms, number of passes, length cut from the top of the ingot, finishing-temperature, condition of the rails as to straightness on the hot-bed, and any other points that might affect their quality. I do not mean that all these particulars should be items in the specifications. Certain things are required; but other things, as to which the practice is not dictated, should be noted;—and the maker should furnish to the inspector the opportunity for noting them.

2. That the inspector select from each lot an agreed percentage (say 1 per cent), to be known as "record-rails," painted and distinctly numbered, the heat-number and date of rolling being recorded. These rails should be placed in track at points designated by the railroad engineer, and record should be kept of their location, at the time of which accurate measurement should be made and recorded of the working faces of the rail at each end and in the middle. This measurement and record should be repeated at the end of each year during the life of the rail. A comparison of these records will show the actual annual wear of the rail within 1-200th of an inch, and its total wear up to any given time. A suitable instrument for such measurement of wear will be described below.

3. That the railroad company employ a competent examiner to make the tests and records of wear. His annual report should include the inspector's number; the heat-number; the date and place of location in track; the approximate number, character and speed of passing trains for the year; the weight of cars and locomotives; the conditions as to curve or tangent and grade; the amount of wear, in 200ths of an inch, on the face and interior side of the head; the kind of joints used; the general appearance of the rail; the local conditions of service, etc. Copies of these annual reports should be furnished to the rail-maker, who should be invited to send his own representative to make similar examination; and all possible facilities and information should be freely given to such representative.

4. That the results of all inspections and tests be at all times accessible to either party.

Figs. 1 and 2 illustrate the instrument for measuring wear. In Fig. 1, A shows the Pennsylvania Steel Co.'s Section No. 67, for 85-lb. rails. (The dotted line, aa, represents the top of the American Society's 80-lb. section.) Two opposite 3-16-in. holes are drilled into the head in the center of the rail, and at points 2 in. from the ends. The center-line, b c, between the holes of each pair, is the base-line for all measurements. It will be noted that this base-line is fixed, and will not be affected by wear or age; nor do the joints interfere with it. The hole on the inside (at b) is drilled deep enough to prevent its pointed end from being worn away by wheel-flanges. The drilling may be done at the mill or in the track.

B is a clamp, provided with points, as shown, to fit the two holes, so that, when adjusted, it will always occupy the same position, rendering the measurements taken in the space between the rail-head and the inner surface of the clamp (as shown by the dotted lines opposite No. 1, No. 2, etc.) perfectly accurate for purposes of comparison. After the measurements have been takes, the holes b and c are filled with wax, to prevent oxidation.

As already pointed out, the base-line from which all meas-

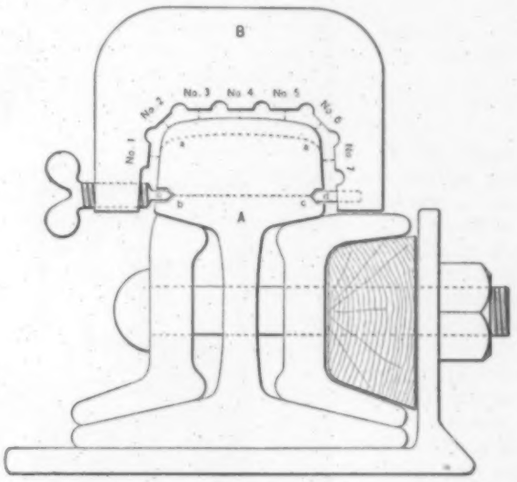


FIG. 2.

urements are taken is the line b, c, joining the points at the bottom of the two 3-16-in. holes. These points are fixed and will not be disturbed by the wear of the rail. It is possible that the walls of these holes might be disturbed; in which case the holes would be reamed out at the time of taking the measurement. The stud d and the thumbscrew "E" come in contact with the rail only at the points b and c.

The necessity of going below the surface to secure a fixed base-line arises from the fact that the surface is subject to change through wear and oxidation. Possibly better methods than those shown can be devised to secure accurate records of change due to wear. Any method by which this end is reached would accomplish the object in view, viz., a complete and reliable history of the rail from birth to death.

Fig. 2 represents a curved tapering scale with which the distance between the clamp and the rail-head at points No. 1 to No. 7, in Fig. 1, can be easily and closely measured. The taper here shown is 8 to 1; but it might easily be made 12, or even 20, to 1. The object of curving the scale is, that it may reach the bottom of pretty sharp depressions in the rail-face. If made straight, it would bridge them.

*Continuation of the discussion of Wm. R. Webster's paper at the Richmond meeting of the American Institute of Mining Engineers.

President Charles M. Schwab of the United States Steel Corporation, it is said, will give $250,000 to the city of Braddock, Pa., for the endowment of a hospital.

A HEAVY HYDRAULIC PRESS.

A 2500-ton hydraulic press, built by the C. F. Elmes Engineering Works, of Chicago, has been installed in the plant of Messrs. Featherstone & Co., in the same city. The press and pumps together weigh about thirty-eight tons and some conception of the massive construction may be gained by a comparison of the relative proportions of the man who is leaning on the connecting pipes in the accompanying half-tone.

The press is equipped with four, belted, plunger pumps and there is an operating valve, located between the pump and press, which is worked either by hand or foot power for starting and stopping. This style machine is made in almost any desired size.

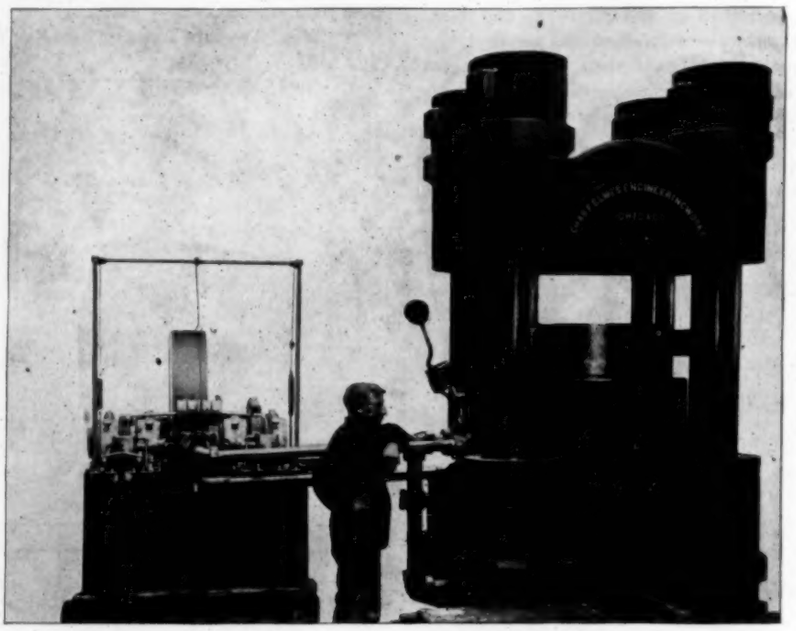
The Featherstone Co. are using the press for the production of heavy sheet metal work and die making.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The annual meeting of the stockholders of the Youngstown Foundry & Machine Co. will be held on July 16, and the capital of the company will be increased from $50,000 to $75,000. The amount realized from the sale of the additional capital stock will be spent in an extension to the main foundry building and the installation of two electric cranes. Other improvements are contemplated but have not been definitely decided upon.



2,500-TON HYDRAULIC PRESS.

Amended articles of incorporation of the Mesaba Iron Co., of Duluth, Minn., have been filed, whereby the capital stock of the company is increased from $50,000 to $500,000.

The Waukon Iron Co., of Dubuque, Ia., has increased its capital stock from $50,000 to $500,000. The increased capitalization will be utilized in greatly extending the operations of the company.

The General Machinery Co., of New York, has been incorporated with a capital of $20,000. J. W. Sturges, V. J. Mayo and I. L. Reed are the incorporators.

The Lombard Governor Co., of Jersey City, N. J., has been organized with a capital of $500,000, to manufacture machinery. Joseph Bennett, Homer Loring and K. K. McLaren are the incorporators.

The Imperial Manufacturing Co. of St. Paul, has been incorporated with a capital of $500,000, to manufacture electrical appliances and heating apparatus. M. D. Flower is president; M. P. Ryan, vice-president; J. W. Shepard, secretary. The above officers together with G. R. Kibbe and J. C. Michael compose the board of directors.

The Marion Co-operative Machine and Boiler Co., of Marion, Ind., has been incorporated with a capital of $20,000, to equip plants for the manufacture of oil and gas well supplies. The incorporators are J. R. Keenan, F. A. Mitchell, William L. Denson, F. M. Gilchrist and S. T. Denson.

At a meeting of the board of directors of the Nova Scotia Steel Co., held at Halifax, N. S., last week, the company was re-organized under the name of the Nova Scotia Steel and Coal Co. The capital of the company is $9,500,000. The directors of the old company were re-elected.

At a recent meeting of the stockholders of the Salem Iron Co., held at Salem, O., several propositions to increase the capital stock were considered but none were adopted, action being deferred until some later day. The present capitalization is $250,000. But owing to recent improvements this capitalization will be practically doubled. The company operates the old Grafton Iron Co.'s plant at Leetonia, O. B. Miller of Cleveland, O., is president of the company and M. J. McKeefrey of Leetonia, O., secretary.

The firm of D. Saunders' Sons, of Yonkers, N. Y., manufacturers of pipe threading and cutting machinery, has been incorporated with a capital of $75,000. The directors are Alexander Saunders, L. M. Saunders and Ervin Saunders, of Yorkers.

The Bryan Vacuum Molding Machine Co. has been incorporated at New York with a capital of $3,000. The directors are E. C. Lufkin and J. H. Bryan, of Buffalo, and N. M. Clark of Lockport.

The Carnahan Tin Plate Co., of Jersey City, N. J., has been incorporated with a capital of $500,000. The incorporators are K. K. McLaren, Horace S. Gould, John I. Billings.

The Rotary Braiding Machine Co. is a new corporation at Camden, N. J., with a capital of $300,000. Arthur C. Demiston, James A. MacPeak and Wm. F. Eidell are the incorporators.

The Goellen Iron Works, of 20 Winans av., Newark, N. J. recently incorporated with a capital of $100,000, to manufacture structural iron work. The incorporators are Fred Goellen, Rosalia Goellen, Henrietta Goellen and Charles Goellen.

The Moffatt Railway Bearing Co., has been incorporated at Augusta, Me. The capital stock is $25,000,000, half in preferred and half in common stock. The company was organized to manufacture and deal in railroad car, and other, bearings and to build and construct railroad rolling stock upon

which bearings are used. C. D. Booth, of Portland, is president.

The Pierce Motor Vehicle Co., of East Bound Brook, N. J., has been incorporated with a capital of $40,000, and will manufacture automobiles. The incorporators are R. V. Pierce, V. Mott Pierce, Hugh C. Pierce, Elmer S. Smith and Wm. K. Bassford, Jr.

The Waukesha Sheet Steel Co., with a capital of $250,000 has been incorporated at Madison, Wis. John E. Jones, F. J. Patterson and T. E. Ryan are the incorporators.

Arrangements have at last been completed for the location of the Bell Watch Co., in Appleton, Wis., and figures are being received for the erection of the main building which is to cost $50,000.

The Westmoreland Light, Heat and Power Co. has been organized at Greensburg, Pa., with a capital of $500,000. The incorporators are E. H. Blair, Edward E. Robbins, James E. McFarland, M. L. Painter, W. S. Lane, Daniel Monahan, James K. Clark and D. C. Ogden. The following companies were absorbed by the new concern: Westmoreland Electric Co., Irwin Electric Co., Jeannette and Manore Electric Co. Improvements will be made on the plants to the amount of $200,000. James Boyan, of Pittsburg, has been selected as chief engineer.

W. H. Crawford & Co., of Nashville, Tenn., invite estimates on coal-mining machinery of a capacity of ten or more car loads daily.

The Union Mfg. & Specialty Co. been organized at Buffalo to manufacture machine tools; capital $15,000. Directors are W. H. Crosby and W. H. Hill, of Buffalo; A. D. Dana, of Springfield, Mass.

The Quick Acting Wrench Co., Chicago, has been incorporated by Charles D. Albert, J. Telfer and Z. C. Shaw, with a capital stock of $3,000. The company will manufacture wrenches.

The New Era Machinery Co. of Newark, N. J., has been incorporated with a capital of $200,000 to manufacture machinery.

The White Steel Gate Co. of Waco, Texas, has been incorporated with a capital of $5,000. J. F. Sedwick, S. J. Hanson and A. Sedwick are the incorporators.

Fires and Accidents:—

The plant of the National Pump Co., Mound City, Ill., was destroyed by fire June 24.

F. S. Babbit's machine shop at Taunton, Mass., was destroyed by fire last week entailing a loss of $10,000.

The overturning of a ladle containing 10 tons of molten iron at blast furnace No. 4 at the South Chicago, Ill., plant of the Illinois Steel Co., into running water resulted in an explosion which caused the death of one man and the seriously burning of several others.

The Champion Mfg. Co.'s works at Blairsville, Pa., have been partly destroyed by fire with considerable loss. The works were owned and operated by Pittsburg capitalists.

New Construction:—

The Arthur Fritsch Foundry & Machine Co., St. Louis, has increased its capital stock from $24,000 to $50,000. It is building an addition to its machine shop, making its dimensions 76x310 feet.

The Sterling Electrical Manufacturing Co. will erect its new $50,000 plant at Warren, O. Other cities offered bonuses as high as $10,000 for the location of the plant in their respective localities.

The Lalance-Grosjean Co. will shortly install two electric cranes and seven gas producers at its Harrisburg, Pa., plant. Two open-hearth furnaces will also be added and two hot and one cold tin mill.

Harman & Hassert, of Bloomsburg, Pa., are adding to their foundry equipment. A new 7-ton cupola, a travelling crane and a fifty horsepower engine are among the recent purchases.

A steel-frame boiler house will be made and erected by Wm. B. Scaife & Sons, of Pittsburg, for the L. Glesenkamp & Sons' Carriage Works, of the same city.

The Dempster Mill Mfg. Co., of Beatrice, Neb., will increase the capacity of the machine shop and foundry about one-third at an estimated cost of $20,000. New buildings will be erected and a complete galvanizing plant is to be installed.

Work on the merchant bar mill of Times & Hecht at Scranton, Pa., is progressing rapidly. A spike mill is soon to be added and a building for the installation of a galvanizing department is now under construction.

The Reading Iron Co. of Reading, Pa., has decided to rebuild the rolling mill at Danville, Pa., recently destroyed by fire. The new plant will cost about $100,000.

The Pittsburg District:—

The Iron City Engineering Co. of Pittsburg, Pa., has been incorporated with a capitalization of $25,000. Charles W. Ridinger is president and Harry D. Hershey is secretary and treasurer. Offices are located at 410 Penn Ave. The incorporation succeeds the partnership of Fessenden & Ridinger, contracting electrical engineers and manufacturers' agents. The company handles the following products: Warren inductor alternators, Stickney gas and gasoline engines, Akron direct current generators and motors, steam engines and boilers, Packard transformers, Packard incandescent lamps, Manhattan enclosed arc lamps, Electric Appliance Co.'s electric supplies, Electra imported arc carbons, National domestic arc carbons, switch-board electrical instruments, portable electrical instruments, recording watt-meters, and rheostats and controllers.

H. P. Dilworth, George M. Dilworth, Henry Buhl, Frank Richardson, Charles B. McLean, George A. McLean, Calvin Wells, J. M. Lockhart, J. H. Lockhart, Pennock Hart and Newton Hemphill, all well known Pittsburg iron manufacturers have organized the Dilworth Coal Co. with a capital of $600,000. A tract of coal land on the Monongahela river consisting of 780 acres has been acquired. The headquarters of the company will be located in Pittsburg.

The Heating, Ventilating & Foundry Co. of Pittsburg, has just completed the erection and equipment of a new and model foundry and machine shop at Lazearville, W. Va., situated on the Wheeling division of the Pennsylvania railroad, about seven miles south of the Steubenville Junction and 17 miles north of Wheeling. The main building of the company's plant is 65x145 feet, and is arranged on the continuous plan. A private siding or railroad switch runs along the full length of the building. The raw material, such as iron, coke, etc., is unloaded from cars on to platforms and into sheds, surrounding the cupola, which has a capacity of five tons. This cupola is located on the side of a large and well arranged molding room, and is equipped with all the latest improvements in cupola practice. Directly in front of the cupola, is situated a two ton jib crane, for handling large ladles of iron and heavy castings. After the castings are made, they pass into the tumbler and emery room, adjoining the molding room, where they are cleaned and ground, and if the castings require machine works, they pass then into the machine shop, adjacent to this room, and then into the store or ware room, adjoining the machine shop and cleaning room. In case no machine work is necessary, the castings pass directly into the storage room from the tumbler and emery room, from where they are loaded into cars, ready to ship. There is no rehandling of either the raw material or the manufactured goods. The power used for running the blower for cupola blast, elevator, cleaning barrels, emery wheels, drill presses, lathes, planers, etc., is furnished by two 25-h. p. gas engines, which are so arranged that they can be run separately or together. The whole plant will be heated and ventilated by what is known as a mechanical furnace system, consisting of large horizontal furnaces, made by the company for heating and blowers for circulating the air, both for winter and summer, thus the building is not only thoroughly heated in the winter, but ventilated the year around, and the engineering of the company in this line is well illustrated. The offices for the company's plant consist of four rooms, two rooms on the ground floor, and two above same. The company will employ about 20 men at the beginning, and made its first melt of iron Monday, July 8. The product of this plant will be about 5 to 10 tons per day, and will be increased as fast as possible. There is a growing demand for heating and ventilating and sanitary apparatus, such as this company manufactures, and judging from the orders the company has been

able to secure, no doubt this plant and the number of men employed will be largely increased in the near future. This company has made provisions for such a contingency by its purchase of land and the arrangement of its buildings, so that increased facilities and buildings can be afforded without affecting the general plan. The company proposes and is equipped not only to manufacture heating and ventilating and sanitary apparatus, but to do a general foundry business.

The Westinghouse Electric & Mfg. Co. has commenced suit against the Lorain Steel Co. of Lorain, O., for alleged infringements on patents owned by the Westinghouse company. The suit was filed in the United States Circuit Court at New York.

The American Bridge Co. has been awarded a contract for 400 tons of structural material to be used in the erection of the Dollar Savings & Trust Co.'s building at Youngstown, O.

Steel ties manufactured by the Carnegie Steel Co. and used on the Bessemer road have proved very satisfactory since their year's use. The entire roadbed will be relaid with these ties as soon as possible.

A large amount of machinery is being installed at the shops of the Fort Wayne railroad at Allegheny, Pa. The latest addition is an immense wheel lathe manufactured by the Pond Mfg. Co. of Plainfield, N. J.

The American Sheet Steel Co. has decided to add eight new mills to the Vandergrift plant at Vandergrift, Pa. This will make this a 29-mill plant instead of 21 as at present.

The headquarters of the Parkersburg Iron & Steel Co. have been removed from the Empire Building in Pittsburg to the Times building. The work of erecting the new plant at Parkersburg, W. Va., is progressing rapidly and operations will be commenced in September or October.

The West and Northwest:—

G. A. Mullins, 226 LaSalle St., Chicago, has closed contracts with the South Halsted Iron Works, Chicago, for one 200-h. p. Cookson heater and purifier; with the Orange Lumber Co., Orange, Texas, for one 500-h. p. Bates Corliss engine; with the D. Clint Prescott Co., Menominee, Mich., for one 500-h. p. Bates Corliss engine, and with the H. Barber Mfg. Co., Chicago, for one 115-h. p. Bates Corliss engine and Cookson feed water and heater.

W. J. Chalmers, of the Allis-Chalmers Co., Chicago, is quoted as saying that at the recent meeting of the Board of Directors of the company held in New York, $2,500,000 was voted for the erection of a new manufacturing plant at Milwaukee, Wis., and $1,250,000 for a new plant to be built on the Atlantic seaboard for the manufacture of engines and mining machinery for foreign trade. He stated that the company had secured 100 acres of land near the Soldiers' Home in Milwaukee, as a location for the plant to be erected in that city, and that contracts for $500,000 worth of the work had been let in New York.

The Variety Mfg. Co., Chicago, manufacturer of the Cross horizontal folding doors, has received an order from the Pennsylvania railroad for 76 doors to be installed on the latter's shed on Pier K, Jersey City, N. J.

S. R. Dawson, Des Moines, Ia., who is claimed to have discovered the secret of the manufacture of Damascus steel, and who was sentenced five years ago to the penitentiary for ten years for the murder of his son-in-law, has been paroled by Governor Shaw at the solicitation of capitalists interested in the company that has been formed for the manufacture of Damascus steel by Dawson's process.

Charles Kaestner & Co., Chicago, is building three direct electric ceiling elevators of 4,000 pounds' capacity each, for the South African Breweries Co., Ltd., Cape Town, South Africa, and one, two-ton single belt electric elevator, for Bain Bros., Palace Brewery, Johannesburg, South Africa.

The M. Campbell Fanning Mill Co., at Detroit, Mich., will erect a two-story addition, 21x50 feet.

General Industrial Notes:—

The American Car & Foundry Co. has leased the plant of the Milton Iron Co. at Williamsport, Pa. John Jenkins will be continued as manager and the present officers of the company will be continued until the end of the present business year.

Work on furnace No. 2 of the National Steel Co.'s plant at Mingo Junction, O., is progressing rapidly and the furnace will be put into blast about August 15.

The furnace of the Eagle Iron Co. at Attalla, Tenn., which has been idle for the past six months resumed operations last week.

The Antikokan Iron Co. of Duluth, Minn., has purchased the interests of McKellar Bros. and Graham on a piece of ore property on the Antikokan range about 150 miles from Port Arthur on the new Canadian Northern Railway. The purchase price of these interests was $156,000. This company has also optioned other iron lands located in this same district.

Seventy of the striking machinists employed at the plant of the Buffalo Forge Co. at Buffalo, N. Y., have returned to work. The men have been on a strike since May 1. The terms of the agreement under which the men returned to work has not been given out.

The Scotch iron and steel manufacturers are preparing to send an influential deputation of manufacturers to this country in September to study the trade conditions in this country and the methods in vogue in the iron and steel mills in this country.

As the result of the refusal of a number of creditors of the McNeil Boiler Co. of Akron, O., to accept less than 100 per cent for the settlement of their claims, the plant is to be offered for sale by the court, and will be sold to the highest bidder. Of the creditors, 65 per cent were willing to settle on an 80 per cent basis and were willing to permit the reorganization of the company. The refusal of the others to accept less than 100 per cent in settlement of their claims has resulted in the sale order. The receivership of Mr. J. B. Campbell has been a highly successful one. Since he has been in charge of the plant its operation has constantly showed a profit.

Work on the erection of the large pipe and skelp mills of the Sharon Steel Co. of Sharon, Pa., was commenced last week.

The application for a rule to show cause why the order confirming the sale of the Rogers Locomotive Works at Paterson N. J., to the Smith-Holran syndicate should not be reopened was dismissed last week. The Smith-Holran syndicate bid $602,000 for the plant and its offer was accepted. The International Power Co. offered $655,000 for the plant, but the court held that its bid was submitted too late.

It is probable that the Pope Tube Works at Hartford, Conn., will be dismantled, owing to the absorption of the Shelby Tube Co. by the United States Steel Corporation. The Pope plant has been idle since its absorption by the Shelby Tube Co., owing to the great cost of operating the plant.

The McClintic-Marshall Construction Co. has signed the scale of the Structural Iron Workers for its Pottstown, Pa., plant. For some time the company refused to sign for this plant, owing to the demands of the men for shorter hours and higher wages.

The chippers and helpers employed at the plant of the Peru Steel Casting Co. at Peru, Ind., went on a strike last week owing to the reduction in wages from $1.50 per day to $1 per day.

It is announced that the railroads operating out of the Birmingham, Ala., district will grant a material reduction of shipments of pig iron for the export trade about July 15.

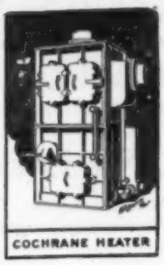
The deed of the formal transfer of the properties of the Sloss Iron & Steel Co. to the Sloss-Sheffield Steel & iron Co. was filed in the probate court at Birmingham, Ala., last week. The Sloss-Sheffield Co. has been in control of the properties of the former concern for more than a year.

The report that all the ore properties of Corrigan, McKinney & Co of Cleveland, O., are under option to the United States Steel Corporation has been emphatically denied by both James Corrigan and Price McKinney.

The action of the employes at the blast furnace of the National Steel Co. at Niles, O., in suddenly quitting the furnace when their demands for higher wages were refused was discountenanced by the executive board of blast furnace workers at a meeting held last week. The men have since returned to work pending a settlement of the difficulty.

The 100 machinists, blacksmiths and helpers of both the New Castle, Pa., plants of the American Tin Plate Co. went out July 1 on strike for a nine-hour day. The men demand the pay for ten hours for the work of nine.

Lest you do not know, or lest you forget.



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For instance, every plant should hav a supplementary boiler feed; a good live steam injector is just the thing for the purpose, but it should not be used for regular feeding because it cannot handle water that has a higher temperature than 150° F. Now our **COCHRANE HEATERS** give a temperature of 210°. That difference between 150° and 210° means a 6% saving in your total fuel bill as compared with feeding with an injector without a Feed-Water Heater, and using a **COCHRANE HEATER** and an independent or direct driven pump, the saving will range from 13% to over 20%—in favor of the "**COCHRANE.**"

So look well to the way you are feeding, and do not be afraid to spend the money for a thermometer to find out what really is the temperature of your feed. If it is less than 200°, bear in mind that the "**COCHRANE**" will help you, presuming that you have the necessary amount of exhaust steam, and you can have purer water than you ever had before, since these

Cochrane Feed-Water Heaters and Purifiers

will improve the quality of any feed supply, no matter how bad.

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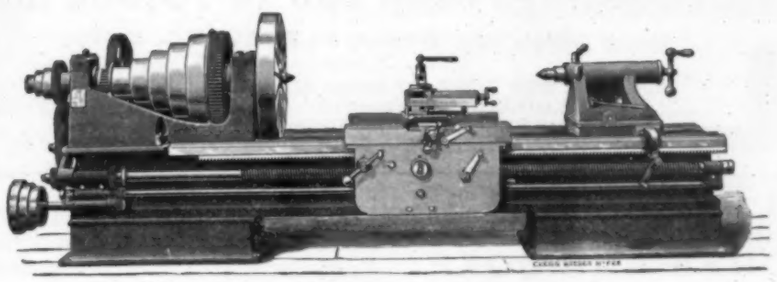
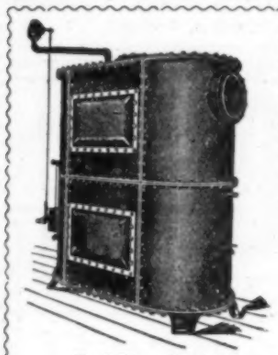


Engine Lathes.

Send for Catalogue D.



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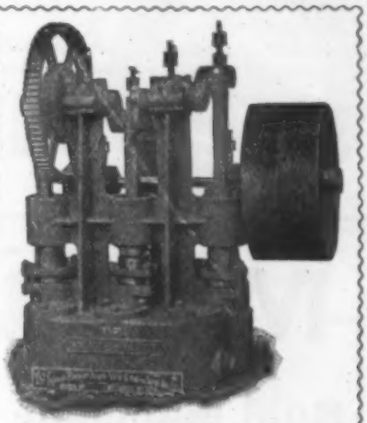

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About the things he has to sell,
Won't reap the golden dollars,
Like one who climbs a tree and—hollers.

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One Self-contained Geared Hoist, for steam or air power, very compact, suitable for dock, vessel or mine.
Will hoist 1100 lbs. 490 ft. per minute.
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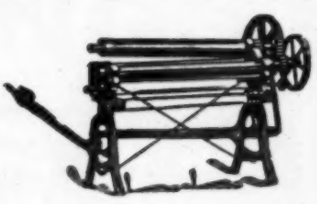

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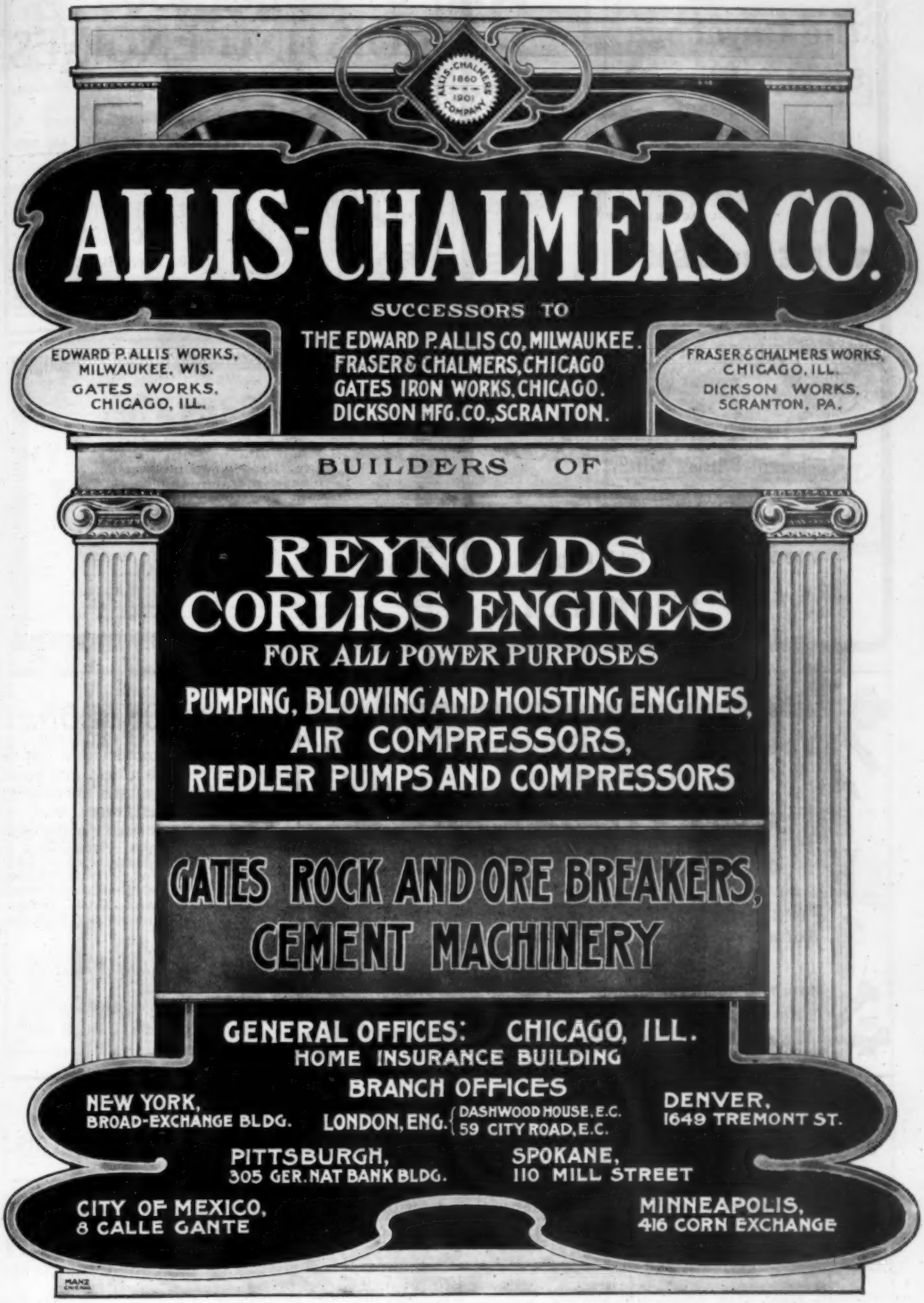
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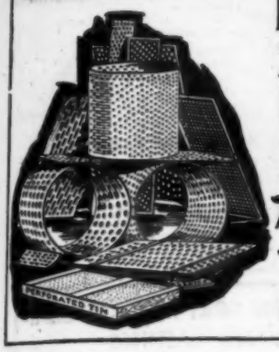

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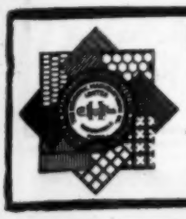

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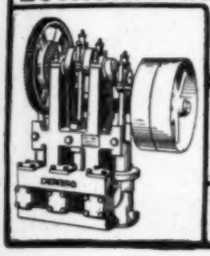

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4:00	1:05	7:00	Lorain	3:32	12:02	7:15
4:18	1:25	7:20	Elyria.....	3:14	11:45	6:59
4:36	1:53	7:43	Grafton	2:56	11:29	6:41
4:58	2:15	8:05	Lester Jun...	2:32	11:08	6:21

5	3	1	Main Line.	2	4	6
P.M.	P.M.	A.M.		A.M.	A.M.	P.M.
5:10	1:35	7:50	Cleveland.....	9:50	12:00	6:00
5:20	1:31	8:27	Lester Jun...	8:48	11:07	5:00
6:31	2:40	8:36	Medina	8:36	10:59	4:48
6:54	2:59	8:57	Seville.....	8:14	10:40	4:26
7:00	3:04	9:03	Sterling	8:03	10:34	4:20
7:22	3:24	9:24	Warwick.....	7:41	10:13	3:56
7:30	3:32	9:31	Canal Fult'n	7:34	10:06	3:48
7:50	3:50	9:50	Ar. Dep. Massillon.	7:15 8 P.M.	9:50	3:30
7:50	3:50	9:50	Dep. Ar.	7:50	9:50	3:30
8:05	4:06	10:05	Justus.....	7:34	9:35	3:13
8:35	4:37	10:36	Canal Dover	7:03	9:05	2:44
8:42	4:44	10:43	New Phila....	6:55	8:58	2:37
9:00	5:01	11:00	Ar. Dep. Urichsville	6:38	8:40	2:20
7 A.M.						
7:30	5:10	11:10	Dep. Ar.	6:38	8:40	2:20
8:06	5:43	11:42	Freeport	6:00	8:06	1:44
		P.M.				
8:32	6:07	12:05	Flushing	5:34	7:42	1:20
9:40	7:05	1:05	Bridgeport...	4:30	6:45	12:20

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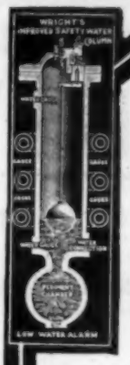

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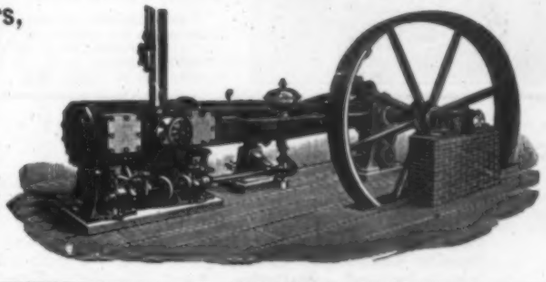

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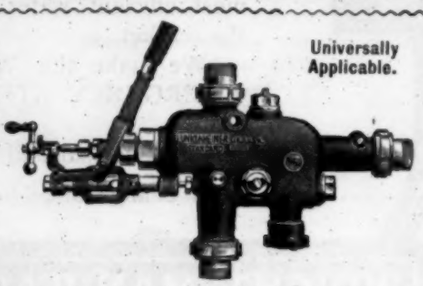

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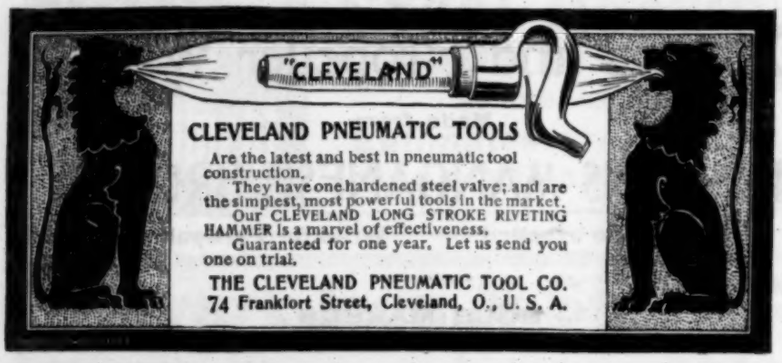

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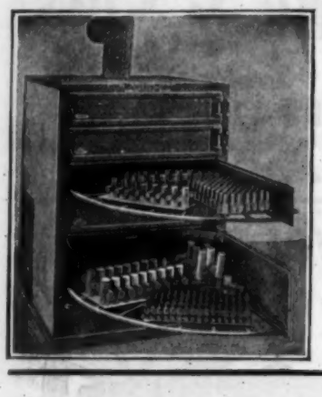

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From Cleveland to	Leave.	Arrive.
Pittsburg & Bellaire	†7:00 a m	†11:20 a m
Salem & Pittsburg	*8:00 a m	*8:30 p m
Salem & Pittsburg	*4:00 p m	*11:30 a m
Philadelphia & New York	*4:00 p m	*11:30 a m
Baltimore & Washington	*4:00 p m	*11:30 a m
Pitts., Bellaire & East	†1:40 p m	†6:30 p m
Baltimore & Washington	†1:40 p m	†6:30 p m
Ravenna & Alliance	*5:00 p m	*8:10 a m
Philadelphia & New York	*11:30 p m	*5:00 a m
Baltimore & Washington	*11:30 p m	*5:00 a m
Pittburg & Wellsville	*11:30 p m	*5:00 a m

Mt. Vernon & Pan-Handle Route

From Cleveland to	Leave.	Arrive.
Akron, Columbus, & Cin.	*8:10 a m	*5:50 p m
Indianapolis & St Louis	*8:10 a m	*5:50 p m
Millersburg & Columbus	†1:20 p m	†1:05 p m
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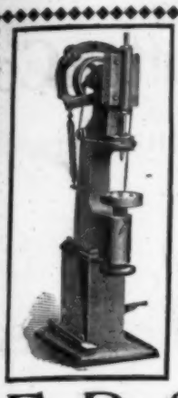

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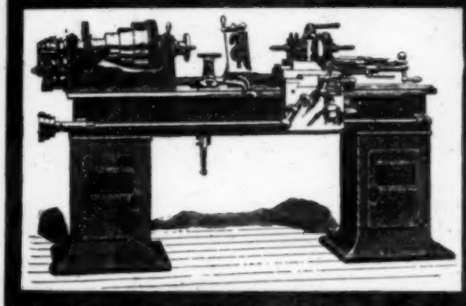

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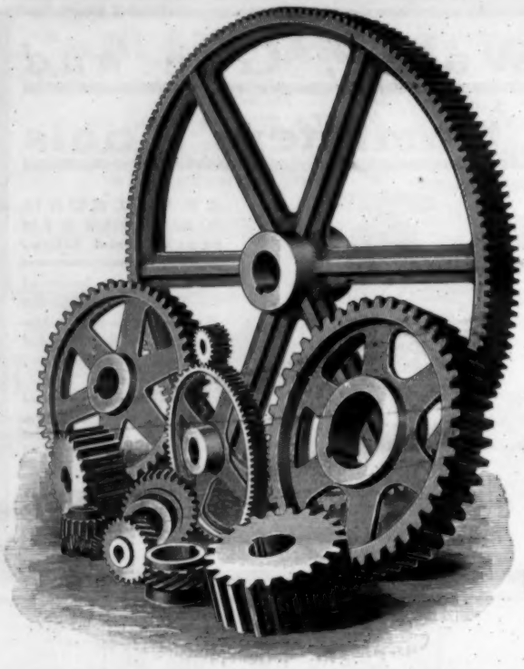

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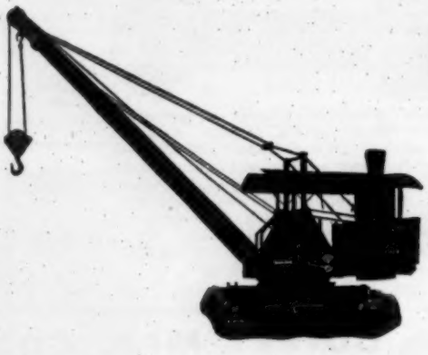

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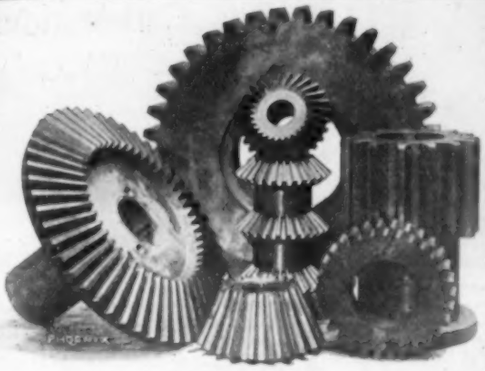

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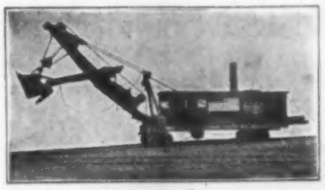

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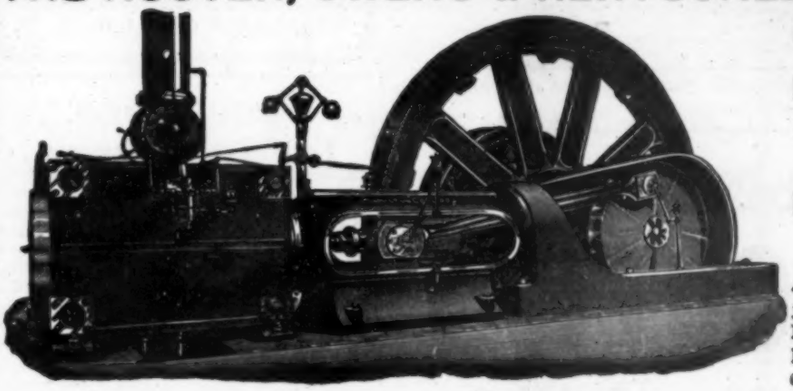

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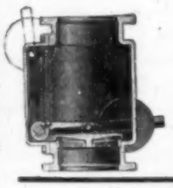

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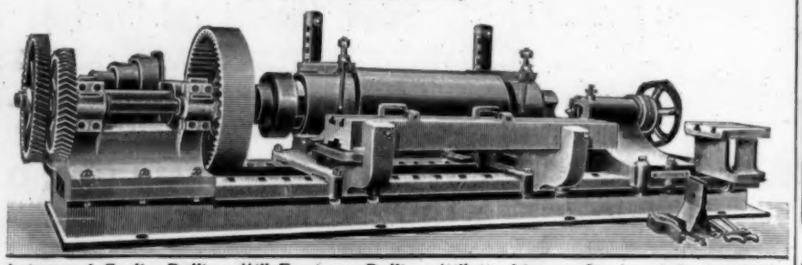

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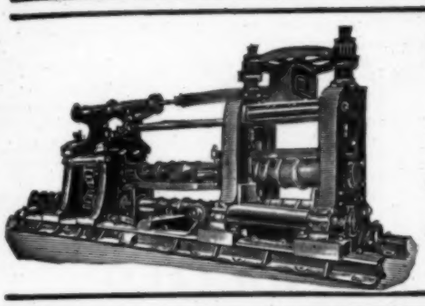

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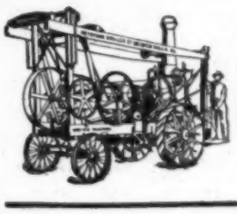

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The methods for analysis of iron ore, iron and steel and for assaying have been given briefly, but perhaps as much in detail as is consistent with the general scope of the book. Several changes and additions to the Specific Gravity tables have been made by adoption of later and more accurate values.

In the notes on blast furnace practice have been outlined the more important theoretical and practical points, which, it is hoped, will be of some service to those interested in the manufacture of iron.

The hygrometric table gives the necessary information for determining the amount of moisture in air, a subject whose importance in metallurgical operations is being more fully recognized at present than heretofore. This table is new and is based on the most accurate data available at the present time.

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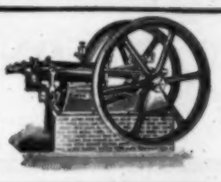

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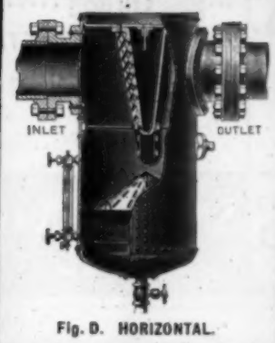

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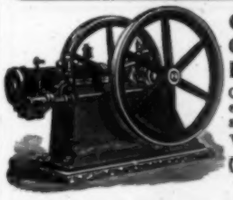

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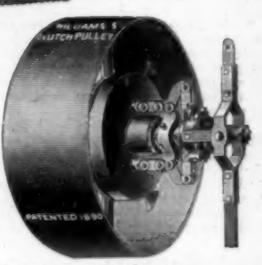

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